CURTIS'S
BOTANICAL MAGAZINE.

CONTAINING HAND-COLOURED FIGURES, WITH DESCRIPTIONS AND OBSERVATIONS ON THE BOTANY, HISTORY AND CULTURE OF NEW AND RARE

PLANTS FROM THE ROYAL BOTANIC GARDENS, KEW, AND OTHER BOTANICAL ESTABLISHMENTS AND PRIVATE GARDENS.

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"With tender heed,
Bringing thee chosen plants and blossoms blown
Among the distant mountains."—*Wordsworth.*

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To

LIBERTY HYDE BAILEY,

TEACHER, ADMINISTRATOR, BOTANIST, HORTICULTURIST, INVESTIGATOR, AUTHOR AND TRAVELLER, FOR FIFTEEN YEARS PROFESSOR OF HORTICULTURE AND FOR TEN YEARS DIRECTOR AND DEAN OF THE COLLEGE OF AGRICULTURE, CORNELL UNIVERSITY, U.S.A., IN RECOGNITION OF HIS LONG DEVOTION TO THE SCIENTIFIC TRAINING OF WORKERS IN HORTICULTURE AND AGRICULTURE AND TO THE INCREASE AND SPREAD OF KNOWLEDGE IN THESE BRANCHES OF SCIENCE, THIS VOLUME IS DEDICATED IN GRATEFUL

APPRECIATION

BY THE

ROYAL HORTICULTURAL SOCIETY.

L. Snelling del. et lith.

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Tab. 9162.

× CRINODONNA CORSII.

Garden-hybrid.

Amaryllidaceae. Tribe Amarylleae.

× Crinodonna Ragioneri in Gard. Chron. Ser. 3, LXIX. 32 (1921).

× **Crinodonna Corsii*** (Crindonna memoria Corsii) Ragioneri in Gard. Chron. Ser. 3, LXIX. 32, fig. 17 (1921); Bull. Soc. Tosc. Ortic. XLVI. 20 (1921); Journ. Roy. Hort. Soc. LII. Proceed. p. cii. (1927).

Syn.: × *Amarcrinum Howardii*, Coutts in Gard. Chron. Ser. 3, LXXVIII. 411, fig. 171 (1925).

Hybrids between *Amaryllis* and allied genera, as *Brunsvigia* and *Lycoris*, have been known for a long time, but the combination represented by the plant illustrated in this place is relatively new. It was produced, as it seems, simultaneously in Italy and in California, although the Italian record antedates the American by several years. It was Dr. Attilio Ragioneri of Castello, near Florence, who first described it in the Gardeners' Chronicle of January 15, 1921, having raised it from *Amaryllis Belladonna* as the female and *Crinum Moorei* as the male parent. Four years later a similar cross was recorded as having been produced by Mr. F. Howard of Los Angeles, California. According to a communication from Mr. T. Hay, Superintendent of the Royal Parks, this too resulted from the fertilisation (in 1910) of some flowers of *Amaryllis Belladonna* with the pollen of *Crinum Moorei*. Four plants were raised. One of them flowered in 1915, another later on, the exact date not being stated, whilst the other two were still without flower when the note was written. The flowers of the first were badly formed, but those of the second agreed with Dr. Ragioneri's plant. Mr. Howard's cross became subsequently known as *Amarcrinum Howardii*, and a figure of it together with a

* Dr. Ragioneri writes "*Crindonna memoria Corsii*." The generic name was intended to indicate the origin of the plant from a *Crinum* and a (*Bella*)*donna*, *Belladonna* being a synonym of *Amaryllis*, as it is understood now, whilst the specific epithet was to preserve "the venerated memory of the late Marquis Bardo Corsi Salvati of Florence, the enthusiastic and very intelligent lover of fine plants, who had formed in his gardens at Sesto (Florentino), the most complete collection of stove and other plants in Italy."

valuable comment was published by Mr. J. Coutts in the Gardeners' Chronicle of November 21, 1925. Mr. Hay presented to Kew two plants out of a consignment he had received from Mr. Howard in 1924, and from one of these the present plate was drawn in 1925. To quote from Mr. Coutts' article :—"The Kew plants were placed in pots, kept in a cool house all the winter, and planted out in their present position during the spring; one bulb was small and has not flowered; the large bulb has produced one flower scape some two feet in height. The first flower opened on October 20, and on October 29 there were twenty open flowers and buds on the umbel. The beautiful pink flowers have retained some of the fragrance of the seed parent, also the shape of the flowers, although there is a distinct curve in the lower portion of the perianth tube, reminding one of the pollen parent. So far the plant has proved evergreen, and the long neck to the bulb and the arrangement of the leaves distinctly indicate the pollen parent, *Crinum Moorei*." The plant has since successfully stood three winters out of doors and flowered regularly from October, and recently even from September to late in November or, in 1928, to the following month when the flowers and part of the foliage were nipped by the frost of December 7th (—8·5° C. or 16·5° F. on the ground); but it has so far not quite attained the dimensions of the Californian specimens whose flower-shafts are said to have been over 1·2 m. high. The general habit is rather that of the male parent with wide laterally grooved and recurved leaves, rising from an elongated collar and persisting through all seasons. The flowers, on the other hand, approach in shape, colour and sweetness of scent, those of the Belladonna-lily except for the presence of a distinct narrow and curved tube proper and the general, though slight, curvature of the limb.

The successful crossing of *Amaryllis Belladonna* and *Crinum Moorei* is not surprising considering the relationship of its parents which is really very close although obscured by the fact that they are at present referred to two distinct genera. A close examination of the groups to which the parents belong will prove this. One of the groups is the genus *Amaryllis* in the narrow sense in which it is understood at present. It comprises at the most two species, all that have retained this generic name out of a veritable jumble of

types, collected by the earlier writers under the designation *Amaryllis.** The other group represents the large series of species, known as *Crinum*. This Herbert divided into two sections, "*Patentes* (spread-flowered)" and "*Semipatentes* (half-spread)." They correspond to the now commonly admitted sections proposed by Baker, (*a*) *Stenaster* and *Platyaster* for the *Patentes* and (*b*) *Codonocrinum* for the *Semipatentes*. Now, morphologically *Amaryllis* is merely a *Codonocrinum* with a perigone whose congenital basal growth is arrested at a very early stage and with a leaf-bearing axis of extreme shortness, whilst physiologically it is characterised by the well-known seasonal duration of its foliage. In the shape of the perigone and the marked declinate posture of the stamens and style *Amaryllis* and *Codonocrinum* are as closely linked as, on the other hand. they are distinct from the remaining two Bakerian sections of *Crinum*. Obviously the primary generic gap in the *Crinum-Amaryllis* series lies between the *Patentes* (*Stenaster* + *Platyaster*) on one hand and the *Semipatentes* (*Codonocrinum*) + *Amaryllis* Herb. on the other hand, whilst that separating the *Semipatentes* (*Codonocrinum*) from the *Amaryllis* of Herbert is of secondary importance and so slight indeed that it may be questioned whether it justifies generic separation. I myself see in the Belladonna-lily of the Cape only the extreme link, in part possibly determined by climatic factors, of the *Codonocrinum*-group. If this view is correct the species of the *Codonocrinum* section will, under the ordinary rules of nomenclature, have to be merged in an extended *Amaryllis* ; *Crinum Moorei* will become *Amaryllis Moorei* and *Crinodonna Corsii* will cease to be a generic hybrid and retain only its specific epithet in the new combination × *Amaryllis Corsii*. The only alternative is to preserve *Amaryllis* in its restricted sense and raise the section *Codonocrinum* to generic rank.

* Linnaeus in the first edition of his Species Plantarum refers nine species to *Amaryllis*. These belong to eight distinct genera as we understand them at present, and none of them is identifiable with our, that is Herbert's *Amaryllis Belladonna*, Linnaeus's species of this name being the West Indian *Hippeastrum equestre*. It is true, in the second edition of the Species Plantarum Linnaeus refers to Miller, Fig. Beautif. Pl. t. 23 (erroneously numbered t. 24 by Miller), which actually represents the Cape Belladonna ; but he quotes it merely as an illustration of the West Indian Belladonna of the first edition. The confusion persisted long. Even as late as 1818, when Ker (previously Gawler) published a revision of *Amaryllis*, the number of whose species had grown to 46, the genus covered over a dozen perfectly distinct genera.

The immediate linkage between the Cape Belladonna-lily and the *Codonocrinum*-group is given by *Amaryllis revoluta* Linn. f. in Aiton, Hort. Kew (1789), synonymous with *Crinum lineare Linn.* f. (1781), and by *A. variabilis* Jacq. (1804), two species which were in cultivation in Aiton's and Jacquin's time and in Herbert's earlier days, but have since been lost in gardens. They are still imperfectly known and it is more than doubtful whether they are specifically distinct. The former was discovered by Thunberg and Masson in the country between the lower reaches of the Van Stadens and Zwartkop rivers in December, 1773; the latter is very probably one of the numerous introductions received at Schoenbrunn from the Austrian collectors Boos and Scholl, who explored much the same ground as Thunberg and Masson. The only more recent herbarium-record of this plant seems to be an inflorescence, collected by T. Cooper in " Kaffraria " (Divs. East London & King Williamstown, or the littoral east of them) in 1860. The resemblance of the flowers of our hybrid and of short-tubed specimens of *A. revoluta*—the length of the tube proper of this species is very variable—is striking. The foliage, however, is distinct, *A. revoluta* possessing apparently two kinds of leaves, larger recumbent outer and narrow suberect inner leaves, which at least in cultivation do not seem to persist always up to the time of flowering.

Description.—An evergreen autumn-flowering *bulb-plant*. *Bulb* ovoid, 8—9 cm. in diameter, with an elongated collar up to 15 cm. long, producing one or several tufts of leaves and, laterally to them, a flowering shaft, 0·5 to over 1 m. high, more or less compressed with blunt angles and up to 4 cm. wide at the base, green, flushed downwards with purple. *Leaves* 10—15 in a tuft, more or less distichous, strap-shaped, recurved, flat or shallowly channelled downwards, laterally grooved, acute, up to 70 cm. by 3—5 cm., dark green. *Umbel* of 8—12 or more flowers; bracts broad, lanceolate-oblong, acute, up to over 10 cm. by 5 cm., green, flushed with red or purple near the base on the back, the outer 2-keeled upwards. *Perigone* funnel-shaped from a short tube, more or less curved, about 10 cm. long by 8—10 cm. across, sweet-scented; tube proper cylindrical, 1—2 cm. long; segments lanceolate, acute, keeled, 9 cm. by 2·5 cm., recurved upwards, the outer and inner often disposed somewhat irregularly in the fully open flower as shown in the plate, rose-coloured, darker on the face downwards, passing into white on the back along the keel. *Stamens* inserted above the tube proper, declinate; filaments 4·5 cm. long; anthers 2 cm. long, soon curved, crescent-shaped. *Style* declinate, exceeding the stamens by 2 cm., deep crimson below the punctiform stigma. *Receptacle* 1—1·2 cm. long; ovules up to 6 in each cell. *Capsule* unknown.

Distribution.—Of garden-origin. O.S.

Fig. 1, tuft of leaves with base of flowering scape; 2, tip of leaf; 3, inflorescence, with a detached flower in side-view below; 4, part of longitudinal section, showing the tube proper and insertion of stamens; 5, anthers; 6, longitudinal section through the receptacle. Fig. 1 reduced ($\times \frac{1}{6}$), the remainder natural size.

L.Snelling del. et lith

Tab. 9163.

PICEA OMORIKA.

Balkan Peninsula.

Coniferae. Tribe Abietineae.

Picea, Linn.; *Benth. & Hook. f. Gen. Plant* III. 439; *Eichl. in Engl. & Prantl, Nat. Pflanzenf.* II. i. 77.

Picea omorika, *Bolle* in Monatschr. Beförd. Gartenb. Preuss. St. 1877, p. 128; affinis *P. brachytylae* Pritzel (Bot. Mag. t. 8669) et *P. yezoënsi* Carr. (*P. ajanensis* Fisch.; Bot. Mag. t. 6743); sed ab utraque differt habitu tandem fere columnari, foliis laxius dispositis in dorso atroviridibus crassioribus semper obtusis, conorum squamis admodum depressis et arctius imbricatis minute vel obscure denticulatis, seminibus latius alatis; a priore praeterea foliis brevioribus (10–15 mm. longis), conis multo brevioribus seminibus alisque minoribus, ab altera ramulorum pubescentia et seminibus alisque maioribus diversa. *P. morindoides* Rehder (Bot. Mag. t. 8169), species sectionis *Omoricae* quoad spatium proxima, habitu et foliis longioribus. tenuioribus acutis et conis longis magis distat.—Purkyně in Oest. Monatschr. Forstwes. 1877, p. 446; Masters in Gard. Chron. XXI. 308, 309, fig. 58 (1884) et in Journ. Linn. Soc. XXII. 203, 204, fig. 28 (1886); Stein in Gartenflora, XXXVI. 13, fig. 4, 5 (1887) et XLVII. 176, fig. 54 (1898); Ascherson in Oest. Bot. Zeitschr. XXXVIII. 34 (1888) et in Aschers. & Graebn. Syn. Mitteleurop. Flora, I. 194 (1897); Eichler in Engl. & Prantl, Nat. Pflanzenf. II. i. 79 (1889); Beck in Mitt. Sect. Naturk. Oest. Turistenclub, 1889, no. 6 et in Engl. & Drude, Veget. d. Erde, IV. 238, fig. 84, 85 (1901) et Fl. Bosn. Herceg. & Novop. Sand. in Glasn. Zem. Mus. Bosn. Herceg. XV. i. 6 (1903); Wettstein in Oest. Bot. Zeitschr. XL. 357 (1890) et in Sitzb. Akad. Wiss. Wien, XCIX. i. 507, t. 1–4 (1890); Fiala in Glasn. Zem. Bosn. Herzeg. IV. 376 (1890); Beissner, Handb. Nadelholzk. 383, fig. 103 (1891) et Ed. 2, p. 283, fig. 62, 63 (1909) et in Mitt. Deutsch. Dendr. Ges. 1901, p. 14; Koehne, Dendrol. 20, fig. 8 (1893); Willkomm, Forstl. Flora, Ed. 2, p. 99 (1897); W. J. B. (Bean) in Gard. Chron. Ser. 3, XXI. 153, fig. 44 (1897); Tubeuf, Nadelhölz. 63, fig. 33 (1897); Lakowitz in Forstl. Naturw. Zeit. 1897, p. 38; Olbrich in Mitt. Deutsch. Dendr. Ges. 1898, p. 38; Degen in Oest. Bot. Zeitschr. XLIX. 184 (1899); Mottet, Conif. 274, fig. 88 (1902) et in Rev. Hort. LXXVII. 238, fig. 94 (1905); et XCI. 269, fig. 86 (1919); Internat. Bot. Kongr. Wien, i. Exkurs. 115, t. 25 (1905); Froebel in Mitt. Deutsch. Dendr. Ges. 1905, p. 46, 50; P. Vilmorin, Hort. Vilmor. 67, t. x (1906); Elwes & Henry, Trees of Great Brit. & Ireland, I. 78–81, t. 28 (1906); Parde, Arbor. Mat. Barres, 104, t. 48 (1906) et Icon. Conif. VI. t. 49 (1914); Neger & Büttner in Naturw. Zeit. Forst-u. Landwirtsch V. 204–210 (1907); Domin in Beihefte, Bot. Centralbl. XXIII. 2. p. 24, 25, t. IV. (1908); Schwerin in Mitt. Deutsch. Dendr. Ges. 1908, p. 87; Adamović in Engl. & Drude, Veg. d. Erde, XI. 463 et alibi (1909) et in Karsten & Schenk, Vegetationsbild. VIII. No. 4, p. 3–6, t. 19, 20 (1910); Clinton-Baker, Ill. Conif. II. t. 43 (1909); Hickel in Bull. Soc. Dendrol. France, 1911, p. 104, 192; Jassoy in Ber. Senckenb. Nat. Ges. Frankfurt, XLII. 249 (1911); Kaeber in Mitt, Deutsch. Dendr. Ges. 1911, p. 105, 108; Silva Tarouca, Uns. Freiland Nadelhölz. 233. fig. 220 n–p. 228, t. 4, fig. g (1913) et Ed. 2, p. 238, fig. 227 n–p. 234, t. 4, fig. g (1923); Bruns in Mitt. Deutsch. Dendr. Ges. 1913, p. 289, fig. p. 291; Neger in Naturw. Zeit. Forst-u. Landwirtsch. XIII. 76 (1915) et Nadelhölz. Ed. 2, p. 61, 66 (1919) et Ed. 3, p. 59, 65 (1927); O. Schindler in Mitt. Deutsch Dendr. Ges. 1915, p. 246, fig. p. 245; R. E. Fries in Act. Hort. Berg. VI. No. 1, t. 80 (1918); Böhlje in Mitt. Deutsch. Dendr. Ges. 1918, p. 282, t. 33; 1926, ii. p. 335, t. 46; Franz Koch, ibid. 1924, p. 92, 94, chart iii; Pape & Wilke, ibid. 1925, p. 359; Tigerstedt, ibid. 1926, i. p. 174, t. 26, 27; Ilvessalo, ibid. 1926, i. p. 126, 130; Boehme, ibid. 1926, i. p. 33; Fitschen, ibid. 1926, ii. p. 49; Rehder, Man. Cult. Trees & Shrubs, 49 (1927); Novak in Mitt. Deutsch. Dendr. Ges. 1927, 47–56, tt. 13–18; Turrill, Plant-Life Balkan Penins. 142, 181, 251, 345, 453 (1929).

Syn. PINUS OMORIKA Pančić, E. Neue Conif. i. d. Oestl. Alpen (1876) et Add. Flor. Princ. Serb. 216 (1884); Willkomm in Zentralbl. Gesammt. Forstwes. 1877, p. 365; Masters in Gard. Chron. VII. 470, 620 (1877); A. Braun in Sitzb. Bot. Ver. Prov. Brandenb. XIX. 45 (1877); Reichenbach f. in Bot. Zeit XXXV. 121, (1877).
ABIES OMORIKA Nyman, Consp. Fl. Eur. 673 (1878–82); Suppl. II. p. 283 (1889–90).

The inclusion of this remarkable tree in the pages of the Botanical Magazine has long been overdue. From the day of its discovery it aroused the interest of the botanists, partly on account of its singular habit, which recalls the growth of the cypress, and partly on account of the structure of its leaves, in which the functions of the morphologically upper and lower sides appear to be reversed, conditions which are not matched among the European spruces. Besides, it was considered remarkable as an obvious relic of a flora which in Europe was at its zenith long before the glacial period, to whose rigours it succumbed. Nor was its singular beauty lost on the gardeners who discovered in it a quick grower and a conifer of unusual hardiness. It is therefore not surprising that it has given rise to a considerable literature, to which little that is new and of real importance can be added. Of this a valuable summary has been given by Dr. Fr. Novak of Prague in a paper, "Zur fünfzig-jährigen Entdeckung der Picea Omorika," in the "Mitteilungen of the Deutsche Dendrologische Gesellschaft" of 1927. Bibliographical lists concerning the tree are contained in Wettstein's monograph of *Picea omorika* (1890) and in a paper in Čech by Novak in the fifth volume of Věda Přirodni (1924); but as the former is out of date and the latter hardly accessible, it has been considered desirable to compile a complete and up-to-date bibliography, botanical and horticultural, and to add it here in the place reserved for literary references, giving up the remaining available space to a condensed summary of our knowledge of the tree and a general appreciation of its position in botany and horticulture.

P. omorika was discovered in 1875 by Professor Joseph Pančić, the indefatigable pioneer-explorer of the flora of Serbia, in the Tara Planina on the right bank of the Drina in about 44° N. The locality forms the easternmost station of a small area, the greater part of which is situated on the other side of the river in Bosnian territory, extending from the Yavor Planina to the neighbourhood of Višegrad. A

second somewhat smaller area lies farther up the Drina and across it in the district of Foča, whilst a third and still smaller area is recorded from northern Montenegro (near the sources of the Piva). These three island-areas are situated between 44° 1′ and 43° N. and 18° 16′ and 19° 1′ 45″ E. Here *P. omorika* occurs either as a more or less subordinate component in the mixed deciduous forest or more rarely in almost pure stands (omorika-forest). It is confined to altitudes of 800–1,600 m., preferring the steep mountain sides of narrow valleys and gorges. Excellent views of the omorika-spruce in its natural habitats may be seen in Elwes and Henry's " Trees of Great Britain and Ireland," in Karsten and Schenk's " Vegetationsbilder " and in Novak's paper referred to above. It is confined to limestone soil and apparently renews itself very sparingly. Young trees have a pyramidal crown, whose shape, however, becomes more and more tapering with age, until the characteristic columnar habit of the old tree is reached. In close formation the trees drop the lower branches, leaving the slender boles bare to high up. Their sombre colouring is due to the flattened needles turning everywhere their dark green backs to, and their white-lined stomatiferous faces away from, the light. This very peculiar condition has early suggested affinity with the east-asiatic *Picea yezoënsis* (or *P. ajanensis*) and certain American spruces and their inclusion in a special section *Omorika* of *Picea*. The omorika-spruce appeared thus as a completely isolated type among its European and west-asiatic congeners, separated by thousands of miles from its nearest ally. This gap has since then been considerably reduced by the discovery of *P. brachytyla* in western China and the recognition of the Central-Himalayan *P. morindoides* as another member of the Omorika-section. This, however, does not affect the relic-character of the Serbian spruce. It rather emphasises the linkage with *P. yezoënsis* and confirms the assumption of its great geological age, a theory, which is amply supported by fossil finds in Europe of spruces, either identical with or at any rate closely allied to *P. omorika*, and by the occurrence in the Balkans of a considerable number of types which show a similar distribution.

P. omorika was first introduced into cultivation in 1881 by Froebel of Zürich, who had received seed from Pančić soon after its discovery. It has since found its way into gardens

in all but the driest parts of Europe as a highly ornamental tree. It is hardy even as far north as Central Sweden, Finland and Leningrad, it is a quick grower and it has been found exceptionally resistant to coal, smoke and dust.

Our plate has been prepared from specimens supplied by the Marquis of Headfort, of Kells, Co. Meath, Ireland.

Description.—A *tree* up to over 40 m. high with a slender trunk (up to 38 cm. in diameter) and a narrow, almost columnar, crown whose main branches are more or less horizontal with ascending tips and pendulous branchlets which are dull- to blackish-brown and puberulous; bark of old trees coffee-brown, scaling off in plates. *Buds* ovoid-conical, rather acute, dark brown, up to 7 mm. by 5 mm. *Needles* very shortly and stoutly stalked, placed and directed as shown in the plate, moderately flat, blunt with a very obscure apiculus, 14–18 mm. by 1·5–2 mm., their faces with two broad whitish lines, in which the stomata are situated, in cross-section depressedly rhomboid with blunt edges and midrib, with a continuous peripheral layer of fibres and two resin-ducts on the underside. *Male strobiles* or catkins numerous, solitary or whorled (12–15), purple, ovoid-globose, 10 cm. by 7–8 mm.; connectival appendages of the stamens depressed, obovoid, crenulate. *Female strobiles* lateral and terminal, erect, oblong-ellipsoid, 2·5 cm. by 1·2 cm., bluish-purple. *Mature cones* more or less pendulous, oblong-cylindrical to ovoid-oblong, obtuse, shortly cylindrical to ovoid-oblong, shortly narrowed at both ends, 4–6 cm. by 2·5 cm.; scales tightly imbricate with a short broad obversely triangular claw and a very broad flatly rounded depressed tip, up to 12 mm. wide, minutely or obscurely denticulate, very finely striate, dark cinnamon-brown. *Seeds* elliptic in outline, 2–3 mm. long; wing obliquely obovate, 8 mm. by 4·5 mm., brownish.

Distribution.—South-east Europe. Serbia and Bosnia, Drina basin.

O.S.

Fig. 1 a flowering branch nat. size; 2, base and top of a leaf, × 8; 3, cross-section of leaf, × 8; 4, another in front and side-view, × 8; 5, pollen-grain, × 70; 6, a flowering branch, nat. size; 7, bract and ovuliferous scale, × 4; 8, ovuliferous scale with ovules, × 6; 9, cone, nat. size; 10, seed, × 3.

L. Snelling del. et lith.

Tab. 9164.
EUSTEPHIA PAMIANA.

Amaryllideae. Tribe Amarylleae.
Eustephia, *Cav.*; *Benth. & Hook. f. Gen. Plant.* III. 732; *Pax in Engl. & Prantl, Nat. Pflanzenf.* II. 5. 115.

Eustephia Pamiana, *Stapf (sp. nov.)*; affinis *E. argentinæ*, Pax, a qua differt perigonio inferne rubro superne viridi, staminibus e perigonio haud exsertis filamentis inæquilongis e basi liberis appendicibus subulatis incurvis cornutis, stigmate oblique truncato obscure 3-lobato.

The genus *Eustephia* was originally (1795) proposed by Cavanilles for a plant of unknown origin which flowered in the botanic garden at Madrid in 1794. Dean Herbert in his essay on the order *Amaryllidaceae* (1837) rejected it at first uncompromisingly* as based on an entirely incorrect drawing and a very bad description. Subsequently, however, he recognised it implicitly by proposing in the text to t. 3865 of the Botanical Magazine (1841), a new species, *Eustephia Macleania*, which he had grown from bulbs supplied by Maclean. Many years later (1875) J. G. Baker described in the Gardeners' Chronicle (New Ser. IV. 7) a new species of *Phaedranassa*, *P. rubroviridis*, creating for it a new section *Odontopus*. The material for it was supplied by a Mr. Green of Reigate, who had raised the plant from a consignment of Andine bulbs, the exact origin of which was unknown. In the course of his studies of *Amaryllidaceae* Baker became aware of its generic identity with *Eustephia* of which he now gave a full description. He went, however, farther and identified (1878) Green's plant also specifically with Cavanilles's. In this he may have been wrong as neither his description nor Green's specimen, which is preserved in the Kew Herbarium, tally quite with Cavanilles's account and figure. However, the genus was now sufficiently established to be generally recognised. It was long considered as monotypic until Pax in 1890 described two new species, *E. argentina* and *E. marginata*, both from the province of Catamarca, Argentine. Of these *E. marginata* has since been re-examined by R. E. Fries, who found it to agree in its staminal characters with his new genus *Eustephiopsis*, which

* "*Eustephia* delenda, utpote falso delineatum, diagnosi pessima. Numquam talis invenietur."

he distinguishes from *Eustephia* by the union of the filamental appendages into a ring from which their tips rise as blunt or acute teeth whilst the lower more or less winged portions of the filaments remain free. To the typical eustephias has now to be added our plant which was raised by Major A. Pam in 1926 from bulbs received from Tucuman. It differs from the remainder of the genus in the colour of the flowers, which are half red and half green, and particularly in the hornshaped dark red appendages of the filaments. The two Argentine species flower in their home in the southern summer (November to February), whilst Major Pam's plant flowered in his garden at Wormley Bury, Broxbourne, in April.

When rejecting *Eustephia*, Herbert remarked (Amaryll. 156) "I have no doubt that the plant intended was a *Phycella* with appendages at the mouth of the tube which have been incorrectly transferred to the mouth of the limb and fastened on the extremity of the filaments." We know that Cavanilles's draftsman took no such liberties. We might rather say it was Nature herself who did. For *Eustephia* is indeed a *Phycella* with the staminal appendages raised to two thirds or more of the height of the filaments. In not a few species of *Phycella*, a small well-known Chilean genus, similar appendages, though mostly smaller or quite insignificant, occur at the base of the filaments, whilst in other species they are absent. In all other respects *Phycella* resembles *Eustephia* so much that the species could not be recognised as belonging to one or the other without reference to the position of these appendages. There seems to be therefore no justification for retaining the generic distinction of the two groups and *Eustephia* being the earlier name, it will have to stand for both. This appears the more rational as similar conditions obtain in *Allium* where we find the filaments either simply filiform or upwards tricuspidate (§*Porrum*) or basaly bidentate (§*Schoenoprasum* and species of §*Molium*). If this view is accepted *Eustephia* might be said to consist of two sections *Acrostephia* or *Eustephia* proper and *Phycella*. So far the eustephias proper are known only from Peru and the Argentine, whilst those of the *Phycella*-type are with one exception (*Phycella graciliflora* from Mendoza) apparently confined to Chile.

Description.—A *bulb* plant, in flower about up to 40 or

50 cm. high. *Bulb* ovoid, 7–8 cm. long, 6 cm. in diameter, produced into a stout collar, 5 cm. long, covered with dark brown bulbilliferous scales, partly fleshy and up to 1 cm. thick towards the base. *Leaves* about 6, in a tuft, sheathing at the base, sheaths 15–25 cm. long, truncate at the mouth, streaked with red; blades linear, shallowly channelled, subobtuse, with a narrow scaberulous cartilaginous margin, up to 35 cm. by 5–7 mm., glabrous, green, slightly glaucous. *Scape* cylindrical, glabrous, 30–40 cm. high. *Inflorescence* an umbel of about 6 pedicelled nodding flowers supported by a pair of ovate-lanceolate membranous acute spathaceous bracts, 4–6 cm. long; inner special bracts narrowly linear up to 2 cm. long; pedicels red or purple, 4–4·5 cm. long. *Receptacle* ovoid-oblong, 8 mm. long, slightly grooved. *Perigone* sharply pointed in bud, tubular to obconical when open, segments united at the base up to 5 mm. clavate-spatulate, 3–3·5 cm. long, 6–7 mm. wide upwards, the outer shortly cuspidate-acuminate, *the inner quite obtuse, all segments green outside in the upper half with red tips or edges and purplish red below the middle, much paler inside and almost flesh-coloured downwards, the inner dark red right across the uppermost quarter. Stamens* inserted at the mouth of the tube proper, *free from the base, and included in the perigone; filaments with 2 horn-like incurved appendages at two-thirds of their length*, linear, somewhat fleshy and pale up to the appendages, then filiform, red, *the outer 3·5, the inner 4·5 mm. long*; anthers versatile, oblong, 4–5 mm. long, dark purple. *Style* filiform, with an obliquely truncate obscurely 2-lipped stigma, red upwards, 3 cm. long. *Crown* of ovary flat; ovules very numerous. *Fruit* unknown.

DISTRIBUTION.—Argentine; Tucuman.

O.S.

Fig. 1, a plant, showing foliage only, × $\frac{1}{3}$; 2, upper part of leaf, nat. size; 3, scape with inflorescence, nat. size; 4, longitudinal section of perigone, × 2; 5, pistil, × 2; 6, bulb, × 2.

1
6
5
4
3
2

Tab. 9165.

RHODODENDRON HAEMATODES.

China.

Ericaceae. Tribe Rhododendreae.
Rhododendron, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron haematodes, Franchet in Bull. Soc. Bot. France, XXXIII. 228, 232 (1886); et (vars.) l. c. XXXIV. 280 (1887); arctissime affinis *R. neriifloro*, Franch., a quo vix differt nisi foliis in dorso dense rufo-tomentosis nec pallide viridibus atque glaberrimis.—Hemsley in Journ. Linn. Soc. XXVI. 24 (1889); Diels in Notes Roy. Bot. Gard. Edinb. VII. 208, 211 (1912) (var. *calycinum*); Forrest in Journ. Roy. Hort. Soc. XLI. 204 (1915); Millais, Rhododendrons, ser. I. 183 (1917) et ser. II. 153 c. ic. (1924); Journ. Roy. Hort. Soc. LII. Proc. p. lii (1927); Handel-Mazzetti, Südwest China, 212 (1927).

The present very beautiful and hardy rhododendron was discovered in 1885 by Père Delavay in the thickets which clothe the slopes below the summit of Tsang shan (4300 m.) (Tali range) in Yunnan. George Forrest in 1906, and also later on, collected it on the eastern flank of the same mountains at 3000–3300 m. in "rocky open situations in mountain meadows" and in shady places of gullies and gorges where it, and also *R. neriiflorum*, "eclipse everything in beauty with their cherry-coloured and deep crimson blooms." Handel-Mazzetti, who still later (1916) explored the mountains, likewise records both species. *R. neriiflorum*, apparently the commoner of the two, smothers, he says, in company with *R. trichocladum*, the whole slope with its flowers, whilst *R. haematodes* is a component of the almost impenetrable rhododendron undergrowth of the moist, mossy forest below the summit. The association of these species on Tsang shan—they do not seem to have been observed anywhere else—is of special interest as their distinction rests almost exclusively on the presence (*R. haematodes*) or absence (*R. neriiflorum*) of a felted more or less rust-coloured tomentum on the young shoots and on the underside of the leaves. This difference in hairiness extends to some degree to the inflorescences, the pedicels of *R. neriiflorum* being more sparingly and more finely tomentose than those of *R. haematodes*. Intermediate conditions have so far not been observed in the field-specimens at hand, nor to our knowledge in gardens, except in Mr. Magor's collection at Lamellen, St. Tudy, Cornwall, where, according to a note by him in the Kew

Herbarium, a series of plants was raised from Chinese seed sent by Forrest, " of which the leaves vary from almost pure *neriiflorum* to *haematodes*." These intermediates are evidently of hybrid-origin and not phases of a fluctuation-curve as in the case of Franchet's variety *hypoleucum*, where the tomentum is merely whitish, instead of rust-coloured, and disappears early in part. This variety and v. *calycinum*, also of Franchet, were mainly based on the remarkable dimensions of the often unequal membranous red calyx-segments which in var. *hypoleucum* attain a length of up to 2 cm. Normally the deeply cleft calyx is very short, 2-5 mm. high with rather equal rounded lobes, often broader than high and firmly fleshy at the base, but thinner upwards. It is this thin portion of the calyx which often grows out into larger, membranous, very brightly coloured lobes of unequal size and shape. Nothing in the incidence of this aberration from the type or in the nature of the parts affected by it suggests to us a definite strain such as might receive a distinctive name. It seems rather that we have to deal here with individual disturbances brought about by a yet unknown cause. They also occur in other species, as in certain members of the *Maddenii*-series.

It is to Mr. Forrest that we owe the introduction of *R. haematodes* into this country where it deserves to receive every consideration on account of its beauty and its hardiness under conditions which provide for partial shade and an ample supply of water. For the model from which our drawing was prepared we are indebted to Mr. A. M. Williams, of Churston Ferrers, South Devon.

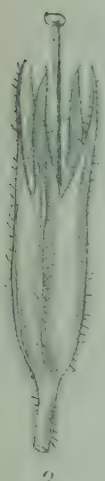
Description.—A *shrub* up to 3 m. high with stout short or often gnarled branches, finely tomentose when young; old bark peeling off in thin flakes. *Leaves* usually 5–9 with each inflorescence; blades elliptic-oblong from a cuneate or shortly rounded base, obtuse with a short glandular mucro, 4–6 (rarely up to 8) cm. by 2–3 cm., deep green and glabrous on the face, *densely covered with a more or less rust-coloured felt of branched hairs on the back*, lateral nerves in 8–10 pairs, finely impressed on the face; leaf-stalk stout, up to 1·5 cm. long, more or less tomentose or at length glabrescent. *Flowers* in terminal umbels of up to 10 flowers; perules ovate to ovate-oblong, caudate-acuminate to acuminate, up

to 1·7 cm. long, finely pubescent without; bracts early deciduous, oblong, acutely acuminate, pubescent without and within, up to 2·5 cm. long; bracteoles filiform, loosely silkily hairy, up to 1 cm. long; pedicels 2–3 cm. long, reddish, finely tomentose. *Calyx* reddish to crimson, deeply 5-cleft, very variable in size; lobes normally rotundate, broader than high or as broad as high, 1–5 cm. long, floccose-tomentose at the very base, glabrous upwards, often one or the other lobe or several or all of them enlarged, ovate to obovate, up to 2 cm. long, membranous and very brightly coloured. *Corolla* tubular-campanulate with 5 spreading lobes, mostly deep crimson, more rarely rose, glabrous, fleshy; tube 2–2·5 cm. by 1·5–1·7 cm. (in the middle), limb 4–4·5 cm. across, lobes suborbicular, emarginate, 1·5–2 cm. in diameter. *Stamens* 10, filaments 1·7–2 cm. long, reddish and minutely papillose below, very rarely glabrous; anthers 3–4 mm. long. *Disc* annular, 5-lobed, green. *Ovary* sub-cylindrical, densely whitish tomentose, 5–6 mm. long; style slender, glabrous, greenish, 2–2·3 cm. long; stigma truncate-clavate. *Capsule* unknown.

Distribution.—China; West Yunnan, mountains above Tali. O.S. & F.B.

Fig. 1, flowering branch; 2, a leaf, back view; 3, corolla cut open, seen from within; 4, a stamen, ×4; 5, ovary and lower portion of style, ×3; 6, upper portion of style and stigma, ×3; figs. 1–3 nat. size.

1



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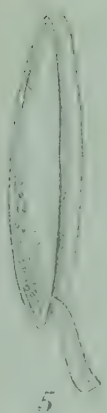

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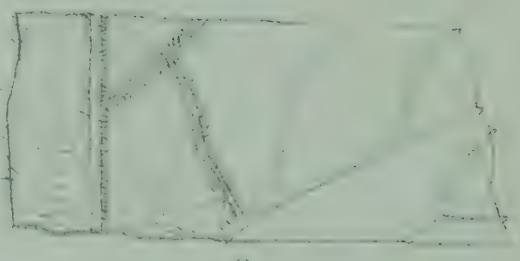

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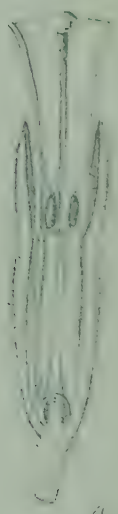

4

Trevithick del L.Snelling lith.

TAB. 9166.

PRIMULA VULGARIS HETEROCHROMA.

Orient.

PRIMULACEAE. Tribe PRIMULEAE.

PRIMULA, Linn.; *Benth. & Hook. f. Gen. Plant* II. 631; *Pax in Engl. & Prantl, Nat. Pflanzenf.* IV. i. 105, *et in Pflanzenreich*, IV. 237, 17.

Primula vulgaris heterochroma, *W. W. Smith & Forrest* (pro subspecie) in Not. Bot. Gard. Edinb. XVI. 42 (1928); a caeteris subspeciebus *P. acaulis* sens. lat. differt foliorum laminis in dorso molliter areneoso-tomentosis basi plerumque breviter vel abrupte in petiolum demum bene elongatum anguste alatum abeuntibus nec non corollae colore admodum vario (albo, roseo, purpureo, caeruleo, citrino).

Syn.: *P. acaulis*, Hohenacker, Enum. Pl. Elisabethpol in Bull. Soc. Nat. Mosc. VI. 220 (1833); Buhse & Boiss. Aufzähl. Transkauk. & Pers. Pflanz. 144 (1860); Lomakin, Spic. Rast. Talysch in Trud. Tiflis. Bot. Sad. i. 60 (1895); haud alior.

P. acaulis v. genuina, Chelkovnikoff, Excurs. Talyche in Monit. Jard. Bot. Tiflis, Livr. 3, p. 9, 14 (1906), haud alior.

P. acaulis v. rosea, Lom. l. c. (1895), haud Boiss.

P. acaulis v. Sibthorpii, Chelk. l. c. (1906), haud alior.

P. amoena v. acaulis, C. A. Meyer in Verzeichn. Pflanz. Caucas. 114 (1831); Hohenacker, Enum. Pl. Talysch. in Bull. Soc. Nat. Mosc. 1838, 317.

P. heterochroma, Stapf in Denkschr. Akad. Wiss Wien, l. 70 (1885); Pax in Engl. Bot. Jahrb. X. 181 (1889) et in Pflanzenreich, Primulac. 56 (1905); Grossheim, Veg. & Fl. Talysch-Geb. in Beih. Bot. Centralbl. XLIII, 2, p. 1, 7, 8, 19 (1927).

Towards the end of April, 1882, Thomas Pichler, who as collector accompanied Dr. J. E. Polak on his expedition to Hamadan, obtained near Kudum, a village (63 m.s.m.) in the littoral of Ghilan, N. Persia, a primula which I described (1885) as *P. heterochroma*. Kusnezoff, in an interesting paragraph on the primulas of the Caucasus (1901), sees in it a close approach to the primrose which Buhse in 1849 collected near Asterabad in Mazanderan (the Persian province east of Ghilan) and which in his (Kusnezoff's) opinion is identical with the West-European primrose. Pax in his monograph of *Primula* in the Pflanzenreich (1906) came to a similar conclusion, when suggesting that *P. heterochroma* might be merely a *forma hypoleuca* of *P. vulgaris* such as Halacsy mentions in his Conspectus Florae Graecae. Quite recently, however, A. A. Grossheim of Tiflis, in a very suggestive study on the vegetation and flora of Talysch (1926), not only recognises *P. heterochroma* as a distinct species but as one of the leading types of the herbaceous woodland vegetation of Talysch and as one of the "autochthonous Hyrcanian" elements of the Talysch-flora. Since then plants of *P. heterochroma* have been raised in the Edinburgh

Botanic Garden from seed received from the Botanic Garden at Tiflis and these have led Professor W. W. Smith and Mr. G. Forrest (1928) to rank *P. heterochroma* as a subspecies under *P. vulgaris* sensu lat. I may add that the occurrence of a primrose in Talysch, a relatively well-explored district, has long been known; but the plant was mostly simply enumerated as *P. acaulis* or as in Flora Caucasica Critica (1901) referred to *P. acaulis* var. *Sibthorpii*. In view of this divergence of opinion I welcomed the communication of some strong flowering plants by Professor Smith two years ago and of some more, grown indoors in pots, quite recently. From one of the former the accompanying plate was prepared. The plants of the second consignment were rather small-leaved and small-flowered. They agree perfectly in this respect with plants growing at present at Kew from seed obtained in 1928 from the Botanic Garden at Munich and, except for the scantier tomentum of the leaves, with Pichler's plant. I described the flower of *P. heterochroma* as yellow, but I have now to admit that I overlooked one of the specimens then under my observation which had white corollas with traces of a faint flush of rose. The same colour variation is exhibited by the primrose of Asterabad, Buhse's specimens having yellow flowers (according to Kusnezoff), whilst Sintenis's from the same locality (No. 1413) are white-flowered. Lomakin (1895) records from Talysch two colour-forms: "*P. acaulis* (typica)," that is the yellow form, and "*P. acaulis var. rosea* Boiss," with purple flowers, the latter very common in the lower forest zone. Similarly Shelkovnikoff, who visited Talysch in March, 1904, describes the flower of the primrose of this district either as pale yellow ("*P. acaulis v. genuina*") or as white or pale pink to dark azure-blue ("*P. acaulis v. Sibthorpii*"). As to the cultivated plants, those of the first set received from Edinburgh and those grown at Kew had all white flowers with a yellow eye, but those which Professor Smith sent in his second communication had either pink flowers, which turned blue on fading, or yellow flowers, and in one plant pink flowers were succeeded by a pure white flower. As regards the size of the leaves and flowers and their parts a considerable amount of diversity similar to that observable in our primrose may be noticed. There are forms with long and with short calyces as well as such with broad and with narrow corolla-lobes.

The specimen figured here represents a *forma longicalyx macrantha latiloba*, to use Ljungström's* terms. It represents, moreover, an extreme state in so far as its squat appearance is concerned. This is rarely paralleled in the field-specimens at my disposal, which have generally leaf-stalks 5–8 cm. and carry blades of equal or shorter length, as is the case in the plants raised at Kew and in those recently received from Edinburgh. The delicate, at first fluffy, but eventually more or less cobwebby, appearance of the tomentum of the underside of the leaves is due to the presence of very numerous, few- to many-celled, simple or branched, extremely thin-walled hairs. These finally collapse and form a thin cobweb-like film. It is obvious that *P. heterochroma* resembles very closely our common yellow primrose without, however, being identifiable with it. It is about as intimately linked to it as the red primrose of the Orient and the white primrose of the Baleares, the four types constituting a well-defined specific unit, corresponding to W. W. Smith and Forrest's concept of *P. vulgaris* (sensu lato) and technically designable as *P. vulgaris Hudsonii* (*P. var. typica* or *var. genuina*** of authors), *P. v. rubra*, *P. v. balearica* and *P. v. heterochroma*.

Of the four variants of *P. vulgaris* the first three are pre-eminently colour-variants of definite geographical distribution, whilst the last combines variability of colour over a wide range with slight morphological characters of its own. White- and red-flowered individuals or groups of individuals occur occasionally in the western section of the area of the typically yellow *P. v. Hudsonii* and white- and yellow-flowered ones have been found in the area of the typically red-flowered *P. v. rubra*; but they are very rare. Their occurrence affects in no way the importance of the fact that over wide areas definite colours are exclusively or almost exclusively dominant and constant. How are we then to explain the wide colour-range in the corollas of *P. v. heterochroma?* It is not due to a mixing of *P. v. Hudsonii* and *P. v. rubra*, for *P. v. heterochroma* differs in its leaf-characters from both. Now Grossheim, as I have mentioned above, refers

* See Bot. Notiser, 1885, p. 128.

** I avoid the terms *typica* or *genuina*, as they have in this case, as in most, only a nomenclatorial significance, arising out of the accidental circumstance that the form so designated was the first to receive the specific name *vulgaris*. This fact by itself does not render the form typical or genuine in the ordinary sense of the words, a common interpretation, which is as suggestive as it is misleading.

P. heterochroma to his group of autochthonous Hyrcanian species, relics of an eastern old-Mediterranean centre which extended throughout the Pontic region, the Caucasus and the southern Caspian Provinces, the Hyrcania of the Ancients, whilst Troll, in a suggestive paper on Oceanic elements in the flora of Central-Europe, claims for *P. acaulis* the character of a eu-atlantic-mediterranean-montane species. He illustrates his statement by a map showing the distribution of the species from the extreme west to the Caspian. Although his map does not account sufficiently for the discontinuity of the area and partly exaggerates its extension in the south, it represents clearly an old-Mediterranean type with a considerable northward extension along the Atlantic coast of Europe and over the whole of the British Isles. May we, then, not assume the existence of an extensive and wide belt of a variously coloured *Primula acaulis* in late tertiary times and the gradual sorting out of definite colour-variants owing to climatic changes during and subsequent to the glacial period and the desiccation of the southern Mediterranean region, changes which affected least the Caspian section of the area. Slight morphological modifications would naturally have gone hand in hand with the fixing of the colours, accentuating the differentiation of the primrose into its present-day components. If we are right in our deductions, the Caspian primrose would represent a type comparatively little removed from the old-Mediterranean *P. vulgaris*, whilst the rare reds among Hudson's primrose and the yellows among the oriental primrose might be looked upon as reversions to the old stock.

As a garden-plant *P. v. heterochroma* promises well, owing to its wide range of colours and its close physiological affinity with our common primrose. Like this it is essentially a woodland-plant which requires moisture and a certain amount of shade.

DESCRIPTION.—*A perennial* herb of the habit of the common primrose, but the *leaf-blades* rather more shortly contracted into a stalk which elongates markedly after flowering, and softly fluffy to cobweb-downy on the back. *Corollas* varying in colour from white to rose-purple or blue or yellow, with the limb 2·5–3·5 cm. across. *Capsule and seeds* also as in the common primrose.

O.S.

DISTRIBUTION.—Southern coasts of the Caspian from Talysch to East-Mazanderan (up to 1800 m.).

Fig. 1, a whole plant (f. grandiflora, longicalyx, latiloba, longistyla) nat. size; 2, a portion of the back of a leaf, × 3; 3, calyx, × 2; 4, calyx and corolla-tube in longitudinal section, × 2; 5, anther, × 15.

L. Snelling del. et lith.

Tab. 9167.

CARDUNCELLUS MULTIFIDUS.

North Africa.

Compositae. Tribe Cynareae.
Carduncellus, Adans.; *Benth. & Hook. f. Gen. Plant.* II. 483; *O. Hoffmann in Engl. & Prantl, Nat. Pflanzenf.* IV. 5. 332.

Carduncellus multifidus, *Coss. & Dur.* in Bull. Soc. Bot. France, IV. 487 (1857); arcte affinis *C. caeruleo*, Less. (Bot. Mag. t. 2293 sub *Carthamo caeruleo* Willd.), sed gracilior, superne ramosus, capitulis corymbosis minoribus, involucri phyllis intermediis subulato-spinoso-acuminatis, interioribus apice acutis rarius minute membranaceo-apiculatis.—Munby, Cat. Pl. Alg. Ed. 1859, 18; Lojacono Pojero, Fl. Sic. II. 173 (1902).

Syn.: *Carduncellus caeruleus* var. *multifidus*, DC. Prodr. VI. 615 (1837); Munby, Cat. Pl. Alger. Ed. 1866, 21.

Carthamus multifidus, Desf. Fl. Atlant. II. 256 (1800); Munby, Fl. Alger. 91 (1847); Doumergue in Rev. Bot. VIII. 373 (1890); Battandier & Trab. Fl. de l'Alger. 509 (1890); Debeaux, Fl. Kabyl. 213 (1894); Bonnet in Journ. de Bot. IX. 412 (1895); Bonnet & Barratte in Cat. Pl. Tun. 250 (1896).

Onobroma multifidum, Spreng. Syst. III. 393 (1826).

We are indebted for the communication of the specimen depicted in this place to Mr. E. A. Bowles who introduced the plant a few years ago from Algeria, where, as in Tunis, it occurs sporadically throughout the Tell, that is the Mediterranean region.* It has not so far been observed in Morocco. It is found in grass-land and among the scrub of the hill-sides where its stout root-stock descends deep into the ground. It flowers in its home from the end of May or from June to August whilst, if transplanted into our gardens, flowering is somewhat delayed, the plant not being at its best before August. It has proved entirely hardy with Mr. Bowles and promises to be a useful addition to the border where its elegant young foliage in the spring and its rich-blue flowerheads in the summer will be acceptable.

C. multifidus was for some time treated as a variety of *C. caeruleus*, a species much more widely distributed and more common on both sides of the western Mediterranean. This, however, is a coarser plant with unbranched rather stiff stems, less dissected leaves and larger flower-heads whose

* Battandier in Flore de l'Algérie marks it "C.C.C.," that is, very common. This is not borne out by the plant-lists, contained in the numerous accounts of excursions in Algeria. Munby in his Catalogue (ed. 1866) gives it as "assez rare" for the whole region and Doumergue as "très-rare" on the plateau of Oran.

intermediate phylla bear generally a rounded fimbriate appendage. Whilst to-day the claim of a *C. multifidus* to specific rank is admitted, its generic affinity is still a matter of controversy which mainly turns on the assumed greater or lesser importance of certain pappus- and achene-characters, there being little to suggest generic diversity either in the general aspect or in the structure of the flower-heads of the plants which come into consideration. *C. multifidus* and *C. caeruleus* belong to a group, corresponding to Linnaeus's *Carthamus*, which is exclusively Mediterranean in the wider phytogeographical sense of the term, ranging from the Canaries to Turkestan with their headquarters in North Africa and in the nearer Orient. The species of this Linnean *Carthamus* fall very naturally into two groups and several undergroups which may be comprehensively set out in key-form with the standard-species in brackets as follows :—

A—Perennials of the Western Mediterranean region and Eastern North Africa, with mostly blue flowers and a pappus of barbellate or subplumose bristles, very rarely without a pappus ; achenes depressed at the top inside a peripheral crest ; papillary cuff of filaments well developed

(*a*) Pappus bristles very fine and rather soft, united at the base into a ring and deciduous with it, as long as the corolla-tube.—*Carduncellus*, Adans. 1763 (*C. monspeliensium*).

(*b*) Pappus bristles more rigid, not united at the base and persistent, much shorter than the corolla-tube.—*Carduncellus*, Sect. nov. *Emmenopappus*, Stapf (*C. caeruleus*).

B—Annuals, with one exception—a widely spread weed—Oriental, with mostly yellow, more rarely rose or purplish flowers and a persistent paleaceous pappus, if any.

(*a*) Pappus of flat narrow serrulate paleae of different length ; achenes depressed at the top inside a peripheral crest or ring ; filaments with a well developed papillary cuff.—*Kentrophyllum*, Neck. em. DC. 1820 (*K. lanatus*).

(*b*) Pappus of peripheral achenes none, of central achenes as in (*a*) ; peripheral achenes rounded on the top, central as in (*a*) ; papillary cuff of filaments reduced, papillae short.—*Onobroma*, DC. nec. Gaertn. nec. Spreng. 1837 ; (*O. flavescens*).

(*c*) Pappus none ; achenes rounded and smooth on the top without peripheral crest or ring ; papillary cuff of filaments as in (*b*).

Of these groups those under A and those under B are sufficiently linked to be treated as sections, the former of *Carduncellus* (Sections *Eu-Carduncellus* and *Emmenopappus*), the latter of *Carthamus* (sections *Kentrophyllum*, *Onobroma* and *Eu-Carthamus*), and in this scheme our plant will be referable to *Carduncellus* sect. *Emmenopappus*. It is interesting to observe that in both genera abortion of the pappus has occurred without any obvious correlated change in the general structure of the plant. There is, however, this difference, that in *Carduncellus calvus*, the only epappose

species of the genus, the annular crest on the top of the achene has persisted whilst in the epappose achenes of the sections *Onobroma* and *Eu-Carthamus* the crest has completely disappeared, the top being rounded and smooth. The evidence for the evolution of the *Eu-Carthamus* type through *Onobroma* from *Kentrophyllum* is very strong, and it is of special interest as it throws light on the still open problem of the origin of the Safflower, the well-known dye-plant (*Carthamus tinctorius*). Space forbids to enter on this subject more fully, but I may state that its close affinity—through its economically inferior eastern variety *oxyacanthoides*—with *C. oxyacanthus* and its only slightly more remote affinity with *C. flavescens* (Sect. *Onobroma*) point to the area between Mesopotamia and North west India as the centre where the cultivation of the Safflower and its use as one of the most important ancient dyes originated.

Description.—A perennial *herb* up to 30–70 cm. high, with a short stout rootstock ; stems simple in young or weak specimens, otherwise *branched upwards*, coated at the base with wiry fibres, the remains of the sheaths of the basal leaves of the preceding year, terete, finely grooved, loosely woolly with long, soft, curled multicellular hairs. *Leaves* from pinnatifid (lower and middle) to entire (upper) ; basal leaves subrosulate with a short sheathing base (2–3 cm. long) including it up to 30 cm. by 8–9 cm., intermediate leaves sessile, up to 15 cm. long ; pinnae very numerous and very unequal in large specimens, the larger pinnatifid, pinnatilobed or only deeply dentate, oblong to lanceolate in outline, alternating with smaller undivided simply dentate pinnae, lower down these only present, decreasing in size along the petioloid base and gradually reduced to subulate spines or soft bristles ; in smaller specimens all the pinnae more or less alike, linear-lanceolate to linear-subulate ; the tips of all the pinnae, their segments and their teeth spinulose ; upper leaves ovate-lanceolate to lanceolate, dentate, 15–10 cm. long ; all the leaves chartaceous to subcoriaceous, green to slightly glaucous, more or less loosely hairy, like the stems, to almost glabrous. *Flower-heads up to 7 in a subcorymbose arrangement*, in weak specimens often solitary, ovoid, up to 2·5 cm. by 1·5 cm. *Involucral phylla* passing upwards from ovate-lanceolate through rotundate-ovate to lanceolate-linear, the

lower and *intermediate herbaceously caudate- or subulate-acuminate* with a more or less cobwebby woolly tomentum to glabrous, the intermediate fimbriate upwards towards the *subulate acumen, the inner shortly acute or subacuminate*, glabrous, efimbriate, smooth, finely striate. *Torus* densely setose, setae 10–12 mm. long. *Flowers* very numerous, homogamous. *Pappus* setose; setae very numerous, unequal in length, up to 7 or 8 mm. long, all distinctly barbellate, whitish to purple. *Corolla* 2·5 cm. long; tube filiform, pale, limb up to 2 cm. across, blue, segments linear. *Filaments* with a cuff of long papillae above the middle; anthers steel-blue, base acutely 2-lobed. *Achenes* turbinate-oblong with the hilum lateral above the base, smooth, faintly ribbed, yellowish.

Distribution.—North Africa; Mediterranean region of Algeria and Tunis.

O.S.

Fig. 1, a flowering stem; 2, intermediate and upper part of a basal leaf; 3, longitudinal section of flower-head with the setae of the torus omitted; 4, flower; 5, stamens, × 5; 6, style and stigma, × 5; 7, achene; 8, the same enlarged, showing lateral hilum, × 2; 9, pappus-bristle, × 4; 1–4 and 7 nat. size.

W.E. Trevithick del. L. Snelling lith

Tab. 9168.

COROKIA MACROCARPA.

Chatham Island.

Cornaceae. Tribe Corneae.

Corokia, A. Cunn.; *Benth. & Hook. f., Gen. Plant.* I. 949; *Harms in Engl. & Prantl, Nat. Pflanzenf.* III. 8. 264; *Wangerin in Pflanzenreich,* IV. 229. 92.

Corokia macrocarpa, T. Kirk, Stud. Flor. N. Zeal. 224 (1899); affinis *C. buddleoidi*, A. Cunn. (Bot. Mag. t. 9019), foliis pro rata latioribus, inflorescentiis racemosis lateralibus, petalis facie esquamulatis, disco annulari aurantiaco lobulato distincto, ovario 1-loculari, stigmate integro oblique ovato-lanceolato bene distincta.—Cockayne in Trans. N. Zeal. Inst. XXXIV. 271, 279, 292, 299 (1902); Cheeseman, Man. N. Zeal. Flora, 237 (1906) et ed. II. 686 (1925) et Veg. New Zeal. (in Engl. and Drude, Veget. d. Erde, XIV.) 308 (1921); Wangerin in Pflanzenreich, IV. 229, 94 et fig. 21 (1910).
Syn.: *Corokia buddleoides,* F. v. M., Veg. Chath. Islands, 16 (1864), non A. Cunn.
C. buddleoides var. *β.*, Hook. f. Fl. Nov. Zel. I. 98 (1853) et Handb. N. Zeal. Flora, 106 (1864).

On t. 9019 of this Magazine we figured *Corokia buddleoides*, a characteristic member of this attractive genus, whilst two other species, *C. Cotoneaster* and *C. virgata*, had already found a place in an earlier issue (t. 8425 and 8466). We have now the pleasure of adding a further species, *C. macrocarpa*, for the communication of which we are indebted to Mr. G. W. E. Loder, who has been growing it in his garden at Wakehurst Place, Ardingly, Sussex, for more than ten years. *C. macrocarpa* is endemic in the Chatham Islands, where Dr. E. Dieffenbach discovered it in 1840, when he accompanied, as naturalist, an expedition sent out by the New Zealand Company for the acquisition of the islands. His very meagre material, which consisted of one fruiting branch and two pieces with a few very young inflorescences, suggested to the younger Hooker merely the status of a somewhat broad-leaved and large-fruited form of *C. buddleoides*. Mueller obtained better specimens of it from H. H. Travers, who visited the islands in 1863-64. He describes it as a "stately plant, dwarf when growing on the seacoast." He also added a description which, however, is also meant to cover the New Zealand *C. buddleoides* and therefore of no discriminative value. It was not until 1899 that specific rank was claimed for it by T. Kirk who indicated as distinctive characters the axillary disposition of the inflorescences, the relatively broad leaves and the somewhat larger fruits. To these may now

be added the absence of scales at the base of the petals,* the shape of the disc, which is distinctly annular and slightly lobed, and the reduction of the ovary-cells to one, to which the reduction of the stigma to a solitary oblique lobe corresponds.

Cockayne in his most valuable "Account of the Plant-covering of Chatham Island" (1902) enumerates *C. macrocarpa* among the constituents of the Tableland which owes its existence mainly to "the greater moisture and a more peaty soil with a great capacity for holding water . . . Its trees are low, varying in height from 6m. to 9m., and their foliage forms a flat upper surface . . . The tree-trunks are rarely straight, but lean at various angles. The soil consists of black peat with a layer of brownish humus on its surface." The excessive moisture of these forests may be imagined when he tells us, that "the filmy ferns are often so thick, that they completely hide the trunk of tree or fern on which they grow." *C. macrocarpa* is, however, not quite dependent on such extreme conditions, as is shown by its occurrence in the drier limestone-forest which surrounds the central lagoon of the island and occasionally also on the "Dry Ridges" of the Tableland which are much exposed to the wind.

Description.—An erect spreading *shrub*, 4·5–6 m. high; young branches covered with a close appressed silvery white tomentum, becoming glabrescent; *leaves* sessile or shortly stalked, stalks up to 5 mm.; blades *oblong-lanceolate to elliptic-oblong*, acute, subacute or minutely apiculate with a gradually tapering base, coriaceous, upper surface green, glabrous and shining, lower surface densely appressedly silvery-tomentose, margins slightly recurved, 5–9 cm. long by 1·3–2·3 cm. wide, 5–7 pairs of nerves. *Flowers* in short *axillary racemes* of 5–8, 3–4 cm. long; peduncles, pedicels and calyx silvery-tomentose; bracts lanceolate acute, 3–4 mm. long. *Receptacle* subturbinate-oblong, silky-pubescent, 4 mm. long. *Sepals*, rather fleshy, of the shape of triangular teeth, acute, 1·5 mm. long by 1 mm. broad, at the base appressedly hairy. *Petals*

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* Wangerin is his description of *C. macrocarpa*, l. c. says "petala . . . . intus squamula parva ciliata disco appressa aucta." His figure, however, of a petal of this species shows no trace of a scale, nor are scales mentioned in the original description. We certainly have not seen any either in the fresh material or in the dried specimens in the Kew Herbarium.

pale yellow, rather fleshy, thickened along the margin and at the tip, silvery tomentose on the outer surface, glabrous *and without a basal scale* on the face, oblong-lanceolate or oblong, acute or blunted, 5–6 mm. long by up to 2·5 mm. *Filaments* glabrous, 2–3 mm. long, anthers 1·7 mm. long. *Disc* fleshy, glabrous, (5-lobed) orange yellow. *Ovary* 1-celled, containing *one* pendulous ovule from an apical placenta. *Style* rising from the depressed centre of the crown of the ovary, 3 mm. long, glabrous : stigma capitate, irregularly 2-lobed. Drupe broadly oblong, 10 mm. long, bright orange (Cockayne).

DISTRIBUTION.—New Zealand ; Chatham Island only.

O.S. & F.B.

Fig. 1, a flowering branch, nat. size ; 2, a leaf, nat. size ; 3, section through receptacle, × 15 ; 4, part of a raceme, nat. size ; 5, a flower with petals removed, × 7 ; 6, a petal in face view, × 5 ; 7, stamens in front- and back-view, × 7 ; 8, ovary in longitudinal section, × 7.

L. Snelling del. et lith.

Tab. 9169.

× SALVIA SUPERBA.

Europe.

Labiatae. Tribe Salvieae.

Salvia, Linn.; *Benth. & Hook. Gen. Pl.* II. 1194; *Briquet in Engler & Prantl, Nat. Pflanzenf.* IV. 3a. 270.

× **Salvia superba**, *Stapf* (nov. comb.); hybrida sterilis ex *S. silvestri* Linn. et *S. villicauli* Borbás, ab illa habitu elatiore optime virgato fastigiato, foliis omnibus sessilibus, spicis spuriis iam ante anthesin rigide erectis perlongis, ab hac pubescentia tenui, foliis caulinis magis minusve rotundatis, sed minime cordato-amplexicaulibus minus acutis distincta.

Syn.: *S. nemorosa* Mottet in Rev. Hort. I. 471 (1913); Journ. Roy. Hort. Soc. XXXIX. 799 (1914); L. H. Bailey, Stand. Cycl. Hort. 3061, fig. 3537 (1917); The Garden, LXXXIII. 412 (1919); LXXXV. 209 (1922) et XC. 741 (1926), non Linn.

S. nemorosa virgata, Hort. in Horticulture (Boston) XXV. 541 (1917); XXX. 195 (1919); XXXII. 312 (1920).

S. silvestris superba, Hort. in Silva Tarouca & Schneider, Freilandstaud. ed. 3, p. 334 (1922) and ed. 4, p. 322 (1927) c. fig.

S. virgata nemorosa, Hort.; Gardeners' Magazine, LVI. 714 (1913); Gard. Chron. LXXX. 347 (1926); LXXXI. 135 (1927); LXXXII. 228 (1927).

In the issue of September 20, 1913 of the Gardeners' Magazine attention was called to a sage named *Salvia virgata nemorosa*, which it was said was "worthy a position in the most select collection of hardy flowers." The notice was accompanied by a reproduction of a photograph of a large clump of the plant grown at Kew. A few weeks later (October 16) a similar picture appeared in Revue Horticole over the name *Salvia nemorosa*. It was intended to illustrate an article concerning the same plant by M. S. Mottet, who says that he saw it a few years previously in one of the broad borders at Kew, when it struck him much by its fine appearance and the abundance and rich colour of its flowers. He adds that it was presently introduced into Vilmorin's nurseries at Verrières, whence it was distributed in 1912. Specimens in the Garden-Herbarium at Kew prove its existence there as far back as 1900. There are, however no records as to its origin. It was at first grown as *S. virgata*, but about 1904 the name was changed to *S. nemorosa*. The plant is during the summer still one of the most conspicuous objects in the Royal Botanic Gardens at Kew and owing to its general hardiness—it is above all a great drought-resister—its perfect habit and its long-protracted flowering and the profusion of richly coloured flowers, it deserves all the praise which Mottet gave it when he declared it the model of a

good border plant. We may add that it is also easily propagated by division or by cuttings, particularly if taken in the spring and grown on under a bell-glass or handlight. Our plate was drawn from a specimen selected from one of the large bushes at Kew.

The plant is mostly referred to in the horticultural literature as *S. nemorosa*, *S. nemorosa virgata* or *S. virgata nemorosa*, but in the second edition of Silva Tarouca and Schneider's Freilandstauden (1922) it was given a new name, *S. silvestris superba*. As to the specific names involved, it may be remarked that *S. virgata* is obviously out of the question, however descriptive the name might appear, as *S. virgata* is a much coarser plant with much larger, broadly toothed or shallowly lobed and long-stalked leaves in the lower part of the stem and with at last rather divaricate panicles, bearing distant verticillasters and larger flowers. As to *S. silvestris* and *S. nemorosa*, they are specifically synonymous, *S. nemorosa* (1762) designating the eastern, more hairy repesentative of the type originally meant by Linnaeus under *S. silvestris* (1753). This type is commonly found throughout south-eastern Europe and eastwards as far as northern Persia and the Altai. It is common near Vienna, but of sporadical occurrence farther up the Danube and in Moravia and Bohemia. Elsewhere in Central and Western Europe it has frequently been observed as an alien in the neighbourhood of railways and flour-mills which used Hungarian or Russian corn. It was already known to Matthioli, Dodonaeus and Clusius. It is a typical steppe-plant, which on the western fringe of its area affects mainly dry localities such as roadsides, sunny hillsides, vineyards, etc. In many respects it resembles our plant, particularly in the shape and vivid colouring of the flowers and their bracts and in the general appearance of the leaves, but it is a smaller plant of a less rigid habit with the lower leaves borne on slender stalks up to 4 cm. long and with shorter flower-spikes (5–15 cm. long) which before flowering generally nod. It is evident that our plant is not exactly identifiable with *S. silvestris*, but what is it then ? Now among the species of the group to which *S. silvestris* belongs, *S. villicaulis* (*S. amlexicaulis* of Reichenbach, not of Lam.) approaches most closely to it. It is like *S. silvestris*, a native of south-eastern Europe, but of a much more restricted distribution,

being confined to the Balkan Peninsula with a slight northwards extension to Central Hungary. It is coarser than *S. silvestris*, with a habit more like that of our plant, with rigidly virgate, spreadingly hairy, much branched stems, with more acuminate, slightly cordate and stem-clasping leaves, except near the base, where they are very shortly and rather broadly stalked and with much more hairy inflorescences. I am quite familiar with *S. silvestris* in the field and I have, moreover, had an opportunity of comparing living specimens communicated to me by Dr. Handel-Mazzetti from Vienna with plants raised at Kew from seeds of *S. villicaulis* from Bulgaria and with the plant figured here. From their study I have come to the conclusion that the latter is most likely a hybrid of *S. silvestris* and *S. villicaulis*, and for this I propose the name *S. superba*, adopting the epithet from the combination *S. silvestris superba* of gardens.

The hybrid nature of our plant is also suggested by its apparent absolute sterility, none of the plants which I examined during several seasons having ever produced any seed. If my conjecture is correct, the numerous specimens in the Gardens at Kew and elsewhere are very likely clones which would account for their astonishing uniformity. The two assumed parent-species grow in the Balkans intermixed and they would cross as readily as do the other species of their group. Seed of such a crossing may have strayed and given rise to the plant under discussion, though when and where exactly we cannot say.

Description.—A *perennial herb*, producing *numerous* annual *stiffly erect and fastigiate shoots* from a stout persisting base, 1–1·5 *m.* high. *Main stems up to* 1 *cm. in diameter* at the base, branching; branches erect, *virgate*, quandrangular, rather slender upwards, solid with ample pith, softly and shortly greyish-pubescent. *Leaves sessile, with the exception of the first leaves of a shoot which may be very shortly and broadly stalked or attenuated into a sheath-like base;* blades ovate-oblong to oblong, blunt or shortly acute, the largest (lower) up to 7·5 cm. by 3·5 cm., but most much smaller (2·5–4 cm. by 1–1·5 cm.), *rounded to subtruncate at the base, not stem-clasping*, crenulate, slightly greyish-green, finely rugose, slightly rough on the face, minutely pubescent on the back.

Inflorescences (false spikes), several to many from a branch, *fastigiate, stiffly erect from the beginning, up to over* 20 *cm. long, finely pubescent ;* verticillasters close at first with their *bracts almost imbricate,* the lowest at length distant by 1·2–1·5 cm. ; bracts rotundate-ovate or obovate, suddenly contracted into a fine mucro, red-purple, up to 5 mm. by 5 mm., ciliolate, otherwise almost glabrous ; pedicels slender, up to 2 mm. long. *Calyx* as shown in fig. 6, about 5 mm. long ; scarcely enlarged after flowering. *Corolla* as shown in the plate (figs. 6–9), 10–12 mm. long. *Stamens barren ;* anthers yellow without pollen, as in fig. 9. *Style* long exserted from the upper lip ; *nutlets* barren.

Distribution.—Only known in cultivation.

O.S.

Fig. 1, a pair of leaves from near the base of a shoot, nat. size ; 2, half of a basal leaf, showing the short petiole, nat. size ; 3 and 4, parts of the upper and lower side of a leaf respectively, ×9 ; 5, an inflorescence, nat. size ; 6, a flower in side view, ×5 ; 7, a corolla in front view, showing the concave middle-lobe of the lower lip and between its lateral lobes the laterally compressed upper lip, ×4·5 ; 8, corolla in longitudinal section, ×4·5 ; 9, mouth of corolla-tube, flanked by the lateral lobes of the lower lip, laid open to show the stamens and staminodes, ×4·5.

.Snelling del. et lith.

Tab. 9170.

EPIDENDRUM PUMILUM.

Costa Rica.

Orchidaceae. Tribe Laeliinae.
Epidendrum, Linn.; *Benth. & Hook. f. Gen. Plant.* III. 528; *Pfitzer in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 144.

Epidendrum pumilum, Rolfe in Kew Bull. 1893, p. 171; affine *E. Endresii*, Reichb. f. (Bot. Mag. t. 7855), sed floribus minoribus, sepalis rotundato-ovatis ut petalis virescentibus, labii ungui intermedio longiore, eius lobulis intermediis multicrenulatis, columna breviore distincta.—Rolfe in Orchid Rev. I. 267 (1893) et X. 104 (1902); Schlechter in Fedde Rep. Beih. XIX. 125, 217 (1923); Lankester in Orchid Rev. XXXII. 163 (1924).
Syn. (vide infra): *Epidendrum Adolphi*, Schlechter in Fedde Rep. III. 108 (1906); Lankester in Orchid Rev. XXXII. 163 (errore sub *E. Tonduzii*), 267 (1924).

This pretty orchid belongs to a small group of epidendrums, distinguished by the continuation of the column into three rather large lobes which surround the broad clinandrium like a cuff. The posticous lobe is either entire or emarginate and, if flattened out, broadly truncate like the lateral lobes from which it is separated on each side by a shallow acutely angled sinus. The lateral lobes descend in the front as wings and to these the claw of the lip is so adnate that a short tube is formed from which the tips of the calli of the claw emerge as very conspicuous orange-coloured swellings. This peculiar structure induced the younger Reichenbach to distinguish the group as a genus *Oerstedella* (Bot. Zeit. 1852, p. 932); but the union of the claw of the lip and the columella is a common character in *Epidendrum* and the minor details by which *Oerstedella* might be said to differ from the epidendrums with an adnate labellum and especially from the amphiglottoid species are not sufficiently striking to warrant generic separation. Reichenbach himself recognised this and reduced *Oerstedella* to a section of *Epidendrum* and eventually to a division of Lindley's section *Amphiglottium*. This *Oerstedella*-group comprises only 3 or 4 species, all Costa Rican. Our species was imported from Costa Rica by the firm of Sander & Co. about 1890 and was described 3 years later by Rolfe as *E. pumilum*, a name which has proved not quite appropriate, as specimens of more than double the size (30 cm.) of the original ones have since been seen. No particulars concerning the distribution of the plant were so

far known; but in 1906 Dr. Schlechter described a new species, *E. Adolphi*, which he subsequently identified with *E. pumilum*, and of this he was able to give the exact locality, namely forests on Mt. Tablazo at 1,800 m. about 12 km. to the southwest of Cartago. Schlechter also referred (1923) to our species a plant collected by Prof. Alverto Brenes in woods near Los Angeles de San Ramon at 1400–1500 m., a locality on the western spurs of the volcano Poas, about 50–60 km. northwest of Cartago. More recently (1924) Mr. C. H. Lankester, of Concavas, Costa Rica, found what he considers to be *E. pumilum* on the southern slopes of the volcano Irazu, to the northeast of Cartago, at 2,400 m. He hesitates, however, to accept Schlechter's reduction of *E. Adolphi* to *E. pumilum* and thinks that the former may be identical with a plant he observed on the western spurs of Poas at 2,250 m., but his brief description of the flower hardly bears out his suggestion.* Both plants, he says, inhabit similar localities and they have proved rather successful in their struggle with advancing cultivation as "normally the trees left for shade and growing fence posts suffice to carry on the species."

The model of our plate was drawn from a specimen in the late Mr. H. T. Pitt's collection at Stamford Hill, North London.

Description.—A *herb*, from 12–20 cm. high (rarely up to 30 cm. or more). *Stems* tufted, slender, suberect, clothed with the warty leaf sheaths. *Leaf-sheaths* green to brownish, more or less covered with minute brown warts; blades ovate from a cordate semi-amplexicaul base with the tip bluntly rounded and mostly emarginate, 12–20 mm. by 7–12 mm., glabrous, thinly coriaceous, dark-green on the face, lighter green on the back. *Inflorescence* terminal in a lax raceme of 3–12 flowers, borne on a naked peduncle, 1–2 cm. long; bracts narrowly lanceolate, acuminate, 4–6 mm. long; pedicels slender, with the receptacle 8–12 mm. long. *Sepals ovate-rotundate*, obtuse, *5–6 mm. by 3–5 mm., yellowish-green*, subconcave. *Petals* spatulate, rounded at the tip, *6–8 mm. by 2–3 mm.*, light greenish-

* We have not seen specimens of Schlechter's *E. Adolphi*, but his detailed description agrees in all essential points with our plant, except in so far as he described the lateral sepals as "ovato-oblongis acutis" and does not mention the very marked crenation of the terminal lobules of the lip.

yellow, subconcave. *Lip* adnate to the column, 3-lobed ; lateral lobes shortly oblong, blunt or emarginate, 3 mm. by 1–1·5 mm., light greenish-yellow ; middle lobe consisting *of a long linear base* (*4–5 mm. by 1–1·5 mm.*), *bifurcating at the apex into 2 suborbicular crenate lobes* (*2 mm. across*), sometimes with a short point in the sinus, light greenish-yellow, with 2 or 3 violet spots in front of the soft bright orange basal calli. *Column* with a short entire or emarginate posticus and two lateral lobes with all the lobes truncate, 5 mm. long, greenish towards the base, white with a few minute violet spots on the lobes. *Anther* ellipsoid-globose, blunt in front ; pollinia as shown in figs. 5 and 7.

Distribution.—Costa Rica.

O.S. & F.B.

Fig. 1, a whole plant, nat. size ; 2, a flower, × 3 ; 3, column and lip in side view, × 6 ; 4, column and base of the lip, × 7 ; 5, anther with pollinia, × 14 ; 6, same at a later stage, with the pollinia removed, × 14 ; 7, one pair of pollinia, × 14.

L. Snelling, del et lith.

Tab. 9171.

COTONEASTER GLAUCOPHYLLA f. serotina.

China.

Pomaceae. Tribe Crataegeae.

Cotoneaster, Med.; *Benth. & Hook. f. Gen. Plant* I. 627; *Focke in Engl. & Prantl*, III. 3. 21; *Koehne, Gatt. Pomac.* 8.

Cotoneaster glaucophylla, *Franch.* Pl. Delavay. 222 (1890); species quoad indumentum et foliorum dimensiones admodum varia, inter species sinenses cum *C. turbinato*, Craib, inter Indicas cum *C. frigida*, Wall. comparanda, ab illa foliis ovato-ellipticis vel elliptico-oblongis latioribus in dorso plerumque magis minusve glabrescentibus vel saltem minus dense tomentosis, fructibus maioribus subglobosis differt, ab altera foliis minoribus, saepe multo magis tomentosis fructibus minoribus distincta.—Forma *serotina*, statum aestivalem serius florentem floribundum referre videtur.

Syn.: *C. serotina*, Hutchinson in Bot. Mag. t. 8854 (1920); Journ. Roy. Hort. Soc. XLV. p. xxxix (1920); Rehder, Man. Cult. Tree & Shrubs, 360 (1927).

The specimen represented in the accompanying plate was received in 1925 from the Royal Horticultural Society's Garden at Wisley, where it was grown as *C. glaucophylla*. There was at the time some doubt as to the identity of this species and its relation to *C. serotina*, which five years previously had been figured in the Botanical Magazine, (t. 8854), *C. glaucophylla* being a species described by Franchet from specimens collected by Delavay, no. 3747, whilst *C. serotina* was based on one of Forrest's collectings. As there was then no authentic specimen of *C. glaucophylla* in this country, it was considered expedient to have the plant drawn for the Botanical Magazine with a view to clearing up the problem eventually. When two years later Mr. Hutchinson went to Paris he kindly compared some of Delavay's and Forrest's sheets from the Kew Herbarium with Franchet's original of *C. glaucophylla*, and he also brought back with him material of the latter. It was now possible to revise critically the whole of the material in the Kew collections connected with Franchet's *C. glaucophylla* and Hutchinson's *C. serotina*, the result being that the Wisley plant was identified with *C. serotina*, but also that the latter appeared to be no more than a very floriferous summer-state of the former. The plate which was prepared in 1925 was nevertheless not cancelled as it seemed desirable to put all the facts ascertained on record and to replace and to supplement the earlier plate by a new one.

The original of Franchet's *C. glaucophylla* was collected by Père Delavay in scrub (fruticetis) at Kiaochetong, a place 10 km. to the east of the Pass Koualapo on a spur of the mountain range called Heechanmen by Delavay, at an altitude of 2,500 m. The pass is situated just above Hokin, a town on the road from Tali to Likiang, and in close proximity to the locality where, in November, 1910, Forrest collected the seed from which *C. serotina* was raised, also in scrub and at a similar altitude (2,660 m.). The Heechanmen range and its eastern spurs cover an area of barely the size of the Isle of Wight. They extend from Hokin south to a line marked by the French Mission stations of Mosoyn, Kiangyu and Tapintze, which are so frequently mentioned on Delavay's labels, and the latter of which was for some time his residence. The district is particularly rich in cotoneasters, Franchet, in his Plantae Delavayana (1889) alone, enumerating 6 to 8 species. Delavay collected the specimen quoted by Franchet early in December, 1882, when it was in fruit. The leaves of the shrub were at that time perfectly glabrous and more or less glaucous on the back. Later on, in 1888 and 1889, he added to it flowering and fruiting specimens of a more, and persistently, tomentose type, partly from Koualapo and partly from stations farther south, but within the same district. The difference in the amount and the degree of persistence of the felt-like tomentum of the back of the leaves of these specimens, and, I may add, to some extent in that of the young axes, vegetative and floral, is in extreme cases very striking; but it must be noted that the young unfolded leaves are always, even in the most perfectly glabrescent specimens, thickly felted, the felt sometimes disappearing already during the time of flowering, sometimes only thinning very gradually and leaving traces even at the time of fruiting (Delavay 4124) and sometimes again persisting almost undiminished (Delavay 3941, 4302). Outside this area Schneider collected an intermediate state, similar to Delavay's no. 4124, north of Hokin on the Likiang road, as did Forrest in the Chutong valley in the Mekong basin (25° 25′ N. by 99° 43′ E.) and as far north as the Chungtien plateau on the other side of the Yangtse (in 27° 55′ N.), whilst a form with leaves as glabrous as those of Franchet's original of *C. glaucophylla* was found by Forrest to the southwest of Likiang (in 26° 45′ N. by 100° 12′ E.) and by Henry and Hancock in the neighbourhood of Mengtze.

On the other hand, specimens from the hills east of Tengyue (Forrest 7723) tally perfectly with the persistently tomentose numbers of Delavay mentioned above. This tomentose state represents W. W. Smith's var. *vestita* of *C. glaucophylla*. The same author also distinguishes a var. *meiophylla*, characterised by smaller and more roundish, and, I would add, at length very glabrescent leaves. They are recorded from east and west of Tengyue in 25°–25° 30′ N. But similar, though not so uniformly small, leaves also occur in the "typical" and in the *vestita* state and they do not seem to represent more than phases in a wide range of fluctuation. Thus *C. glaucophylla*, as instanced by the specimens quoted, inhabits the whole of western Yunnan from the Yangtse to the Tonkin-frontier within the wide altitudinal range of 1,600–3,300 m. As to the time of flowering, there are few data available. Delavay found it at 2,500 m. in an early flowering stage on the 7th April, and in another year in a somewhat more advanced condition on the 18th June, whilst Forrest collected it at 3,000–3,300 m, in full flower in June. Ripe fruits were collected by Delavay on Heechanmen as early as the 12th August, and by Forrest and Schneider in September, whilst other collections bear the dates of November and December.

How does, then, *C. serotina* compare with this somewhat unstable *C. glaucophylla?* In growth, in the shape and size of the leaves and their ultimately more or less pronounced glabrescence and in the structure, size and colour of the flowers and fruits *C. serotina* comes quite within the range of *C. glaucophylla*. The only obvious difference is in the size of the corymbs (3–5 cm. in diameter with up to over 50 flowers), which is not attained in any of the field-specimens, their flowering corymbs rarely exceeding 3·5 cm. in diameter and holding on the average 20 to 50 flowers. There seems to be indeed little doubt that the *serotina*-strain of our gardens has sprung from an unusually floriferous and possibly also unusually late-flowering (July to August) specimen of *C. glaucophylla*. This may lower the taxonomic status of our plant, but it will in no way impair its horticultural value as the latest and most floriferous of its kind.

Description (Forma *serotina*).—A much-branched *shrub*, up to 3 m. high, young branches appressedly tomentose, gradually becoming glabrescent, then reddish to dark brown and finally blackish. *Leaf-blades* more or less elliptic from a rounded

or shortly acute base, acute or blunt with a minute mucro, entire, 3·5–6 cm. by 2–3 cm., firmly papery, dark green and glabrous on the face (already in the bud), yellowish on the back in the bud, gradually glabrescent after unfolding and finally quite glabrous, and more or less glaucous, very minutely and scantily papillose, lateral nerves 5 to 8 on each side, mostly rather straight; stalks 4–6 mm. long, finely tomentose to glabrous at length. *Corymbs* terminal on leafy spurs, shortly stalked, *3–5 cm. across*, all the axes whitish tomentose in flower, gradually glabrescent and ultimately glabrous; bracts subulate, from 3 mm. upwards, very small, early deciduous; pedicels 1–4 mm. long. *Receptacle* campanulate-turbinate, 1·5–2 mm. long, whitish-downy without, glabrous within. *Sepals* roundish-ovate, very broad, apiculate, 1 mm. long, more or less downy or glabrescent. *Petals* spreading, suborbicular from a minute claw with some long curly hairs near the base on the face, 2·5 mm. in diameter. *Stamens* about 20, as in fig. 5; filaments 1·5 mm. long; anthers 0·6–0·7 mm. long. *Ovary-crown* villous; styles 2 or 3 mm. long, glabrous, as in figs. 7 and 8. *Fruit* subglobose, crimson, 6 mm. in diameter. *Pyrenes* 2 or 3, semi-ellipsoid (if 2), adnate to the fleshy receptacle to half or more, brown.

DISTRIBUTION.—China. All western Yunnan, of *f. serotina*, North west Yunnan, Hoching valley.

O.S.

Fig. 1, top of a vegetative shoot, nat. size; 2, part of the back of a leaf in flowering time, ×10; 3, a portion of a flowering branch, nat. size; 4, a flower, ×6; 5, receptacle in longitudinal section with sepals and stamens, ×6; 6, a petal, ×8; 7, styles, ×9; 8, pistil with ovary in longitudinal section, ×10; 9, fruiting branch, nat. size; 10, fruit, cut longitudinally, ×4; 11, pyrene in side view, showing below the attachment-scar, ×4; 12 and 13, front and back view of pyrene, ×4.

G Atkinson del L.Snelling lith

Tab. 9172.

ACACIA EXTENSA.

Australia.

Leguminosae. Tribe Acacieae.

Acacia, Willd.; *Benth. & Hook. f., Gen. Plant.* II. 594; *Taubert in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 108.

Acacia extensa, Lindl. in Bot. Reg. App. Swan River, 15 (1839); inter species seriei *Calamiformium* Australiae occidentalis ramis hicinde alatis, phyllodiis magis minusve pentagonis, florum capitulis saepe in racemos longos subaphyllos dispositis distincta.—Benth. in London Journ. Bot. I. 343 (1842) et Fl. Austral. II. 340 (1864) et in Trans. Linn. Soc. XXX. 457 (1875); Meisn. in Lehmann, Pl. Preiss. I. 6 (1844); Diels & Pritzel, Fragm. Phytogeogr. Austral. Occ. 283, 293 (1905); Apgar, Orn. Shrubs U.S., fig. 172 (1910); F. L. Bailey, Stand. Cycl. Hort. I. 182 (1914); R. H. Cambage in Journ. Roy. Soc. N. S. Wales, LVII. 286 (1923).

Syn.: *A. graminea,* Lehm. Del. Sem. Hort. Hamb. (1842); Meisn. in Lehmann, Pl. Preiss. I. 5. (1844).

A. pentaëdra, Regel, Gartenfl. I. 228, t. 24 (1852).

Acacia extensa inhabits the mountainous parts of the south-western corner of West Australia, ranging from about 32° S.L. southwards through the Darling range to King George Sound. It occurs in shady forests and along streams, an adaptation of a more xerophytic type. It is a shrub of medium height (2—3 m.), flowering in its home in August and September, when its wealth of brilliant yellow bloom beautifies its somewhat straggly or tangled growth. The plant was almost simultaneously discovered by James Drummond and by Dr. Ludwig Preiss in 1839. The exact locality of Drummond's collecting is unknown beyond the vague designation of "Swan River" (colony), that of Preiss's is given as "rocks above Princess Royal Harbour" which is in King George Sound at the extreme southern point of the area. The next year Preiss also found it in the northern part of the Darling range in Mahogany Creek, about 25 km. east of Perth. All the subsequent records refer to places between or near these stations. Lindley in 1839 described the species from Drummond's collectings as *A. extensa.* C. F. Meisner (or Meissner) when working out Preiss's Leguminosae recognised (1844) his specimens from King George Sound, which were in fruit, as identical with *A. extensa,* as described by Lindley, whilst he distinguished those from Mahogany Creek as *A. graminea,* a species described by Professor Chr. Lehmann two years earlier. However, a specimen in the Kew Herbarium of Lehmann's

A. graminea with the note "Swan River, J. Drummond (304)" leaves no doubt as to the identity of the two species. Meisner in making the distinction referred to was evidently guided by the fact that the species occurs in two growth-forms, one with more graceful, longer (up to 20 cm.) and frequently recurved phyllodes and another, represented by our plate, with a more rigid habit and stiffer, firmer and shorter (5—12 cm.) phyllodes. Of these the first corresponds to Lindley's description of *A. extensa* and to Lehmann's *A. graminea*, the second to Preiss's *A. extensa* from Princess Royal Harbour. Later collections afford ample proof that the differences are either of the nature of ecological modifications, or maybe, representative of age-stages, young plants of the stiff type grown at Kew inclining very strongly to the laxer and more graceful type with phyllodes up to 20 cm. long.

It seems that our Acacia was soon taken up in continental gardens where, according to Regel, it became known as *A. odorata* and *A. viminea*, names which Regel, evidently unfamiliar with Lindley's and Lehmann's earlier names, replaced by that of *A. pentaëdra* in allusion to the often 5-angled phyllodia. The origin of the plant, depicted in this place from a specimen grown at Kew, is not known. The species is, however, already mentioned in the Kew Handlist of Tender Dicotyledons of 1900. Its stock is from time to time renewed from seeds which germinate readily. It is considered too tender for the open and is therefore grown along with other Australian plants in the Temperate House.

Mr. R. H. Cambage of Sidney, who has extensively studied the seedling stages of acacias, states that the first leaves arise as an opposite pair of paripinnate leaves, each of 4 leaflets. These are followed by a number of bipinnate leaves which in turn are succeeded by phyllodes, these being flatter and broader than those found in the adult plant. Unfortunately this throws no light on the immediate affinity of our species which in Bentham's largely and unavoidably artificial arrangement is placed among the "*Calamiformes Uninerves*," a group of about 10 species, mostly West Australian. Among these *A. extensa* is easily recognised by its partly winged stems, mostly pentagonal phyllodes and the frequently long racemes of flower-heads.

Description.—A glabrous evergreen *shrub* up to 3 m. high; branches *triangular or upwards much compressed and ancipitous, angles sharp, prominent or sometimes winged. Phyllodes* subulate, ending in a minute oblique sharp point, glandular on the concave side of the point, 5–20 cm., by 0·75–1·5 mm., in *cross-section wedge-shaped with a prominent nerve on each of the long sides or 5-angled, the angles whitish, contrasting with the dark green of the interjacent spaces*; nectarial gland 1·5–4 cm. from the base. *Flower-heads* globular, stalked (stalks 4–7 mm. long) and disposed in *axillary racemes* up to 1·5 cm. long or solitary, composed of 20 or more flowers; these globose in bud and 4 mm. in diameter. *Calyx* turbinate, thin, broadly and shallowly 5-lobed, about 1 mm. high, glabrous. *Petals* elliptic-oblong, 2–2·5 mm. long, united at the base, glabrous. *Stamens* very numerous; filaments about 4 mm. long. *Ovary* smooth, up to almost 1 mm. long; style 4–5 mm. long. *Pod* linear, or slightly curved (*fig.* 8), 4 cm. by up to 4 mm., slightly constricted between the seeds. *Seeds* oblong to oval-oblong in outline, brownish-black, 4–5 mm. long, about 2 mm. broad, 1–1·5 mm. thick (according to R. H. Cambage).

Distribution.—South-west Australia, from the Swan River southwards.

O.S. & F.B.

Fig. 1, a flowering branch; 2, a phyllode; 3, cross-section through a phyllode; 4, a flower; 5, calyx; 6, a petal in face view; 7, ovary; 8, a pod. Figs. 1, 2, 8, nat. size, 3—7, × 8.

Tab. 9173.

RHODODENDRON CALOPHYTUM.

China.

Ericaceae. Tribe Rhododendreae.

Rhododendron, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron calophytum, *Franchet in Bull. Soc. Bot. France*, XXXIII. 230 (1886); affine *R. sutchuenensi* Franch., sed foliis et imprimis pedicellis longioribus, stigmate magno disciformi distinctum.—Franchet in Nouv. Arch. Mus. Paris, Sér. 2, X. 45 (1887–8) et in Pl. David. II. 83 (1888); Hemsley & Wilson in Kew Bull., 1910, p. 112; Wilson, Arn. Arb. Exp. China, 1910–11, t. 0265 (1912); Rehder & Wilson in Sargent, Pl. Wilson I. 544 (1913); Wilson, Naturalist in W. China, I. 126 (1913); Millais, Rhododendrons, Ser. 1, 132 (1917), Ser. 2, 98, c. ic. p. 96, 260 (1924); Bean, Trees & Shrubs Hardy Brit. Isles, Ed. 3, II. 347 (1921); C. Leray in Rev. Hort. XVIII. 187, figs. 57–59 (1922); Gard. Chron. Ser. III., LXXVII. 431, c. ic. (1925).

This very beautiful and decorative rhododendron was, in 1869, discovered by Père G. David near the French Mission Station Mupin (about 30° 20′ N. by 102° 25′ S.), West Szechuan, probably on Hongshantin, a mountain a day's journey from, and to the northwest of, the Seminary. David* says of the mountain that its slopes are densely wooded up to 3,000 m. and that rhododendrons abound there, no less than 16 different species having been found. Here also, he observes, was discovered the curious *Davidia involucrata*. Many years later Wilson came across the tree or shrub in various places in West Szechuan, of which he mentions especially the Tanlanshan to the north of Mupin (1908), forests southeast of Tachienlu (1910) and the sacred Washan (1908) (29° 20′ N. by 103° E.). It is, however, from his first collection (no. 3979, October, 1904), the localisation of which is uncertain, that all the plants at present in cultivation in Europe have arisen. Probably it was made on the Tatiliangshan (about 32° 30′ N. by 104° E.), which he crossed in 1904 and to which he refers in the following passage in "A Naturalist in Western China," I. 126—"Between 8,000 feet altitude and the summit (*i.e.* of Tatiliangshan, between Tchyangchiang and Shuichingpu) *Rhododendron calophytum* is extraordinarily abundant, trees 40 to 50 feet tall and 5 to 7 feet in girth with handsome cinnamon-brown bark, cover many acres."** Thus the area of the species appears

* *See* Bretschneider, European Botanical Discoveries in China, p. 846.

** *See* Wilson, Arn. Arb. Exp. China, 1900–11, t. 0265, where a fine specimen of our species is shown in its natural surroundings.

to extend approximately over 3° of Latitude and 2° of Longitude, lying about 400 km. to the west of that of its nearest ally, *R. sutchuenense*. Wilson has insisted on the great uniformity of *R. calophytum* in its native country, but Mr. Millais has recently (1924) pointed out the appearance of colour variations in the gardens of this country. *R. calophytum* is, according to Mr. Millais, perfectly hardy anywhere in Great Britain and will thrive in almost any good garden soil that contains not more than a modicum of lime, provided it is given a somewhat shady position and sufficient moisture about the roots. It is, however, a slow grower and being an early flowerer (March to April) its blossom is often in danger of being frosted. For the model of our drawing we are obliged to Mr. E. J. P. Magor, of Lamellen, St. Tudy, Cornwall.

Description.—An evergreen *bush* or *tree*, up to 15 m. high and up to 1·5 m. in circumference, old bark cinnamon-red, paling with age; branches stout and loosely greyish downy when young. *Leaves* clustered mostly towards the ends of the branches, blades oblanceolate to oblong from a gradually tapering base, abruptly acute, *18 to over 30 cm. by 4–7 cm.*, coriaceous, dull green above, paler below, puberulous and woolly downy along the midrib when young, at length glabrous except some vestiges of down on the very prominent midrib, with 20–25 pairs of lateral nerves; petioles short and stout, 1·5–2·5 cm. long. *Trusses* large, globose, of up to 30 fragrant flowers, up to 25 cm. across; *bracts* broad-elliptic to oblong or spatulate, often long apiculate, brownish with a silvery appressed tomentum within and without, finally glabrescent without, up to 5 cm. long; bracteoles filiform, up to 3 cm. long, silvery tomentose; peduncle stout, conical, up to 2·5 cm. long; *pedicels up to 8·5 cm. long*, glabrous, often scarlet on the exterior side. *Calyx* very small, disc-shaped, obscurely lobed. *Corolla* broadly-campanulate, 4–5 cm. by 6–7 cm. across the limb, white flushed with rose, particularly without, to rose, with a dark purple-red posticous blotch; lobes 5, short and broad, emarginate, and more or less wavy, 1·3–2 cm. by 2·2–3·5 cm. *Stamens* unequal, up to 20 or more; filaments more or less pilose in the lower third (the longer) or near the base only (the shorter), 1·5–3 cm. long; anthers dark brown, 3–3·5 mm.

long. *Ovary* oblong, rounded, glabrous, 7 mm. long; style stout, up to 3 cm. long, terminating in the exserted *large discoid green stigma up to 1 cm. in diameter*. *Capsule* subcylindrical, slightly curved, up to 3–4 cm. long by 1·5 cm. wide, blackish-brown, smooth.

DISTRIBUTION.—China, West Szechuan from 29° 20′–32° 30′ N. Lat.

O.S. & F.B.

Fig. 1, an inflorescence with supporting leaves; 2, a bract; 3, a bracteole; 4 and 5, a short and a long stamen, × 3; 6, pistil. All natural size, except figs. 4 and 5.

L. Snelling del et lith.

Tab. 9174.

GAULTHERIA VEITCHIANA.

China.

Ericaceae. Tribe Gaultherieae.

Gaultheria, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 582; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. I. 45.

Gaultheria Veitchiana, *Craib in Gard. Chron.* Ser. 3, LII. 188 (1912); arcte affinis *G. Hookeri*, C. B. Clarke, foliis maioribus longius petiolatis, racemis numerosis longioribus, corollis maioribus paulo diversa, imprimis calycis segmentis anguste triangularibus acuminatis submembranaceis albidis distinguenda.—Rehder & Wilson in Sargent, Pl. Wilson. I. 554 (1913); Bean, Trees & Shrubs, Hardy i. Brit. Isles, Ed. 3, I. 582 (1921). Syn.: *G. fragrantissima* var. *hirsuta*, Franch. in Nouv. Arch. Mus. Paris, Sér. 2, X. 44 et Pl. David. II. 82 (1888); non Gard. e C. B. Clarke.

Gaultheria Veitchiana is a native of Western Szechuan where according to Wilson it "is widely distributed . . . growing on most mountain-sides, margins of woods and thickets." It is usually a more or less prostrate bush, but may, if more erect, attain to a height of almost 1 m. Its abundant and crowded flowers, which are white with a faint blush of rose towards the tip, and its turquoise- to china-blue fruits render it a welcome addition to the hardy, soft berried *Ericaceae* of our gardens; it will grow well if planted in peat and given a good supply of moisture. Although discovered by Père G. David in the high mountains near Mupin as long ago as 1869 it was not introduced into cultivation until 35 years later when Messrs. Jas. Veitch received seed of it collected by Wilson on Mt. Omei or in its neighbourhood.

Professor Craib has already pointed out the close affinity of our plant and of *G. Hookeri*, a native of Sikkim, adding that "from a purely systematic point of view, the Chinese plant might be regarded as a geographical race of the Sikkim one." Franchet on the other hand identified it with *G. fragrantissima* var. *hirsuta*, a Ceylon plant. From a study of the herbarium material representing the group to which these plants belong, I have come to the conclusion that we have here to deal with a number of very similar, but readily discriminable forms, each with its own definite area and homogeneous within it, and that these forms should therefore be treated as distinct species. This is not the place to discuss the group in detail, but it seems desirable to refer at least

L.Snelling del et lith:

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to those members of the group with which our plant has been associated and also to *G. fragrantissima* in the broad sense in which this name has been used. The former, namely *G. Hookeri* and *G. fragrantissima* var. *hirsuta*, have this in common with our plant, that their branches are more or less beset with coarse spreading brown or blackish hairs which either persist or shrivel and drop, leaving behind their hard bases as small dark warts. This character distinguishes them from the original *G. fragrantissima* of Wallich and other species which have been confused with it, whilst they differ from each other as far as the more conspicuous characters are concerned in the way set out in the following key.

Leaf-blades elliptic, very obtuse at both ends or very shortly pointed at the tip, stout, very rough on the back with the bristles persisting ; rhachis of racemes tomentose ; bracts 2–3 mm. long ; calyx pubescent, segments broad-ovate, acute, densely ciliolate ; corolla villous within (Ceylon). *G. rudis*, Stapf (n. sp.)

Leaf-blades elliptic-oblong to lanceolate, acute, moderately stout and moderately rough, when mature ; rhachis sparingly shortly pubescent ; bracts 4–6 mm. long ; calyx glabrous, ciliolate ; corolla loosely and shortly hairy within

Leaf-blades 4–5 cm. by 2–3·5 cm. ; calyx-segments ovate, subacute, 1·5 mm. long ; corolla pink to pale pink (Sikkim). *G. Hookeri*, C. B. Clarke.

Leaf-blades 6–9 cm. by 2–4 cm. ; calyx-segments ovate-lanceolate, acuminate, 2 mm. long, thin, whitish ; corolla white or very delicately flushed with rose (Szechuan). *G. Veitchiana*, Craib.

G. rudis, as proposed above, is identical with *G. hirsuta*, Gardn. ms. in Herb. Wight, which in the Flora of British India was included as " var. *hirsuta* " in *G. fragrantissima*. The name *G. fragrantissima* was originally (1820) given by Wallich to an " elegant " shrub of Nepal with very fragrant pale pink flowers and leaves which, it was suggested, might be used " as an improver of inferior sorts of tea." It has smooth and glabrous, upwards sharply angular or triquetrous branches, a character by which it is easily distinguished from its erect-growing Indian congeners. It ranges from Nepal to Bhutan and from the Khasia to the Naga Hills on the Assam-Burma frontier. In the Nilgherry and Pulney Hills it is replaced by *G. Leschenaultii*, a species described by De Candolle in 1838. This also has smooth and glabrous branches ; but they are at the same time terete or upwards very slightly angular. Moreover, its leaves are broader and blunter than those of *G. fragrantissima* and its flowers larger and milk-white or slightly tinged with green. A good picture of it may be seen in the Botanical Magazine, t. 5984 (1872) under the name *G. fragrantissima*, an identification, which in

the text accompanying the plate was extended to a very similar plant found in the mountains of Ceylon and catalogued by Moon (1824) as *Andromeda flexuosa*. In Flora of British India (1882) the concept of *G. fragrantissima* was further widened by the inclusion of the Malayan *G. punctata* of Blume (1825), a very common and characteristic shrub of the high mountains of Java with smooth and sharply angular branches like those of the Himalayan *G. fragrantissima*, but with the racemes collected in terminal panicles and not solitary in the axils of fully developed leaves, and with snow-white flowers. A close study of these forms has convinced me that they represent definite units which should be given specific rank. This opinion is confirmed by the results of the anatomical studies of the group by Niedenzu (Engler's Jahrb. XI, 1890) and by chemical research of a more recent date to which I may briefly allude. As long ago as 1871 J. Broughton, Government Quinologist at Ootacamund, Nilgherrys, reported* that he had prepared from " the very common hill plant, the *Andromeda Leschenaultii* " (that is *G. Leschenaultii*) an oil practically identical with and possibly superior to the American " Oil of Wintergreen " which is derived from the leaves of *G. procumbens* or from the bark of *Betula lenta*. The suggestion was not followed up, apparently because at the time the cost of preparation appeared to be high. Similar experiments had been made with the Javanese *G. punctata* even at an earlier date ; but they suffered the same fate. More recently the matter was taken up again in India with the result that differences were revealed in the oils obtained from the " Gaultheria " of the Nilgherries and from that of Assam, that is *G. Leschenaultii* and *G. fragrantissima*, and that these differences were great enough to exclude the former as a commercial source of oil of wintergreen, whilst the latter promises a profitable industry. None of these species, comprised in the *G. fragrantissima* of the floras, is in cultivation except *G. Leschenaultii*, which is sometimes grown in the greenhouse ; but *G. punctata* and *G. fragrantissima* are certainly worth a trial of acclimatisation in the open.

The material from which our plate was prepared was one of the last communications we received from the late Sir John Ross of Bladensburg, Rostrevor, Co. Down, Ireland.

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* Indian Forest Records, V. Pt. 8, pp. 33–39 (1926).

Description.—A *shrub* of a mostly prostrate habit, but occasionally growing into a bush, up to 1 m. high, spreading by suckers, brown-setose, the bristly hairs breaking off near the surface in older branches and giving them a warty appearance. *Leaves* broadly elliptic, oblong or elliptic-lanceolate from a more or less acute base, acute to subacute with a short hard mucro, margin setiferously serrulate, mostly 4·5–10 cm. long by 2–4·5 cm. broad, but varying greatly in size even on the same plant, coriaceous, upper surface light green and glabrous, somewhat shiny, lower surface paler green, loosely setose, the bristles at length partly deciduous, leaving on the backs of the leaves black warts; primary lateral nerves 3 or 4 on each side arising at a very acute angle and very oblique, like the midrib prominent on the back and impressed on the face, net of veins conspicuously impressed on the face; *petiole up to 6 mm. long*, rather stout, setose. *Racemes numerous* and often collected into a leafy panicle, terminal and axillary, *up to 4 cm.* long; peduncle downy-pubescent; bracts broad-ovate, acute, ciliate, up to 6 mm. long by 5 mm. broad; bracteoles broad-ovate, acuminate, ciliate, 3 mm. long. *Calyx* very shallowly cupular, 5-cleft, glabrous; segments *narrowly triangular, acuminate, 2 mm. long, very thin and pale, very minutely ciliate.* *Corolla* white, sometimes delicately flushed with pink, ovoid-urceolate, *up to 6 mm. long* by 5 mm. broad, mouth 1–1·5 mm. across, glabrous without, pubescent within; teeth short, rounded, about 0·5 mm. long, upright or slightly recurved. *Stamens* 10; filaments minutely papillose or sparingly cilioate, 1·5 mm. long; anthers about 1 mm. long, 2-lobed, each lobe terminating in 2 outwardly projecting awns of about the length of the anther. *Ovary* depressed-globose, densely villous, up to 2 mm. diameter; style 2 mm. long, rather obscurely lobed. *Fruits* (false berries) globose to ellipsoid-globose, about 1 cm. in diameter, lighter or darker blue. *Seeds* obliquely obovoid, minutely pitted, not quite 0·5 mm. long.

Distribution.—China. West Szechuan.

O.S.

Fig. 1, a flowering branch, nat. size; 2, a flower with bract and bracteoles, × 6; 3, one half of an androecium and gynoecium, supported by the base of the calyx, × 8; 4, style, × 8; 5, a fruiting branch, nat. size; 6, cross-section of ovary, × 8; 7, seed, × 40.

Snelling del. et lith

Tab. 9175.

CYRTANTHUS RHODODACTYLUS

South Africa.

Amaryllidaceae. Tribe Amaryllideae.

Cyrtanthus, Ait.; *Benth. & Hook. f., Gen. Plant.* III. 729; *Pax in Engl. & Prantl, Nat. Pflanzenf.* II. 5, 109.

Cyrtanthus rhododactylus, *Stapf* (sp. nov.); proximus *C. epiphytico*, J. M. Wood, sed bulbo globoso multo minore in collum breve abeunte, foliis angustioribus, basi minus attenuatis, tubo graciliore, limbo haud recurvo incarnato bene distinctus.

We are indebted for the model of this plate to Sir William Lawrence, Bart., of Burford, Dorking, Surrey, who in 1926 raised the plant from bulbs obtained from Kew. A flowering specimen of the same species was received at Kew from the Botanic Garden at Glasnevin in 1924. In neither case was it possible exactly to trace the origin of the plant; but Mr. J. W. Besant informs me that Glasnevin received it from Mr. James O'Brien in 1909. In any case there is no doubt that it is a native of South Africa.

Our *Cyrtanthus* belongs to a group of species of the section *Monella*, characterised by having slightly curved trumpet-shaped flowers with rather broad lobes and very short filaments. They range throughout the coast region and the eastern central region of Cape Colony to Natal and South-eastern Transvaal, mostly inhabiting dry grassy or rocky mountain-slopes and summits; only *C. epiphyticus*, a native of the forests on the frontier of Natal and Griqualand East, is reported to grow in moss on trees or on rocks. It is this species to which our *Cyrtanthus* approaches most in the shape and size of the corolla; but *C. epiphyticus* is easily distinguished from it by its large ovoid-oblong bulb (9–11 cm. by 3–3·5 cm.) and long collar, its broader and downwards much attenuated leaves and its brilliantly orange or scarlet flowers which, moreover, have a slightly shorter and stouter tube and strongly recurved segments. As to bulbs and leaves it resembles rather *C. MacOwanii*, a species of a more western distribution (Somerset, Graaff Reinet and Fort Beaufort Divisions); but this has smaller, strongly curved orange to orange-red flowers with recurved or revolute perigone-segments.

Like the other species of the *Monella* section, *C. rhododactylus* is eminently suitable for cultivation in the greenhouse, where it will flower freely in the early spring, if given a loose soil of sand and loam and good ventilation. It is readily propagated by the numerous offsets which it forms.

Description.—*Bulbs globose, 2·5 cm. in diameter* with dark brown tunics, *produced into a collar up to 3 cm. long. Leaves* attaining their full length after flowering, linear, acute, flatly channelled, erect or arching, *16–28 cm. by 4–10 mm.*, green. *Scape* erect, terete, 12–15 cm. long, somewhat stout, green or brown-purple at the base. *Umbel* of 6–8 flowers; spathe-valves 2, membranous, brownish-white at the time of flowering, lanceolate, up to 4 cm. long; pedicels slender, up to 2 cm. long. *Perigone* trumpet-shaped *from a slender base*, slightly curved, nodding, 4·5–5 cm. long, up to 2·5 cm. wide across the limb, *rose-scarlet or, the face of the limb, incarnate*; tube 3·5–3·75 cm. long, 1 cm. wide at the mouth; *limb spreading, not recurved*, outer segments oblong-elliptic, inner broad-oblong, all obtuse with a minute apiculus, 1–1·2 cm. long, 6–7 mm. (outer) or 7–9 mm. (inner) wide. *Stamens* in 2 series, inserted in the throat and 3 or 4 mm. below it respectively; filaments 3–4 mm. long; anther 3 mm. long. *Style* exserted about 1 cm. beyond the tube; stigma 3-fid.

Distribution.—South Africa. Exact range unknown.

O.S.

Fig. 1, a bulb with mature leaves; 2 and 3, inflorescences; 4, a perigone cut open; 5, anther in front and back view; 6, stigma. Figs. 5 and 6, × 6; the remainder natural size.

W.E. Trevithick del. et Snelling lith.

Tab. 9176.

SIPHONOSMANTHUS SUAVIS.

Himalaya.

Oleaceae. Tribe Oleae.

Siphonosmanthus, *Stapf* (Gen. nov.); ab *Osmantho* Lour., cui sub titulo sectionis subjunctus erat, corollae tubo cylindrico lobis multo longiore et staminibus alte insertis satis differe videtur ut pro genere proprio habeatur.

Calyx cupulari-campanulatus, 4-lobus. *Corolla hypocraterimorpha, tubo subcylindrico,* lobis imbricatis 4 ovato- vel elliptico-oblongis obtusis. *Stamina* 2, filamentis brevibus *in corollae faucibus vel paulo infra insertis;* antherae elliptico-oblongae, *loculis introrsum dehiscentibus. Ovarium* 2-loculare; stylus filiformis, ovario subaequilongus vel aequilongus; ovula in loculo quoque 2, *ex apice pendula. Drupa* ellipsoideo-globosa, endocarpio crustaceo. *Semina* saepius solitaria; testa tenuissima; albumen amplum, carnosum. *Embryo* centralis; cotyledones lineares vel late oblongae, radicula tenui paulo longiores. *Frutices* glabri. *Folia* opposita, semper-virentia, crenato-dentata vel serrulata. *Flores* in fasciculos terminales vel laterales dispositi.

Species 2, una indica, altera austro-sinensis.

S. suavis *Stapf* (nov. comb.), a *S. Delavayi* Stapf (nov. comb. ex *Osmantho Delavayi,* Franch.; vide Bot. Mag. t. 8459) differt foliis multo maioribus lanceolatis acuminatis, florum fasciculis lateralibus, antheris in fauce subsessilibus breviter exsertis.

Syn.: *Osmanthus suavis,* King ex C. B. Clarke in Hook. f. Fl. Brit. Ind. III. 607 (1882).

Olea sp. Griffith, Itin. Not. 156, no. 785 (1848).

This is a shrub or small tree, recorded so far only from a few localities in Sikkim, Central Bhutan and Manipur. It was discovered in 1838 by Griffith on the descent to "Rydang,"* Bhutan, at 2550 m. He described it in his Itinerary Notes as an "Olea" and a small tree with a dense crown. Then in 1848 J. D. Hooker found it on the Nepalese side of Mt. Tonglo, whilst later collectors recorded it repeatedly from the Sikkim side of the mountain at 2700–3000 m. The Manipur station on the other hand is attested only by a specimen collected by G. Watt on the Government Demarcation Survey of 1881–1882 without any precise locality being stated. When C. B. Clarke elaborated the *Oleaceae* (1882) for the Flora of British India, he observed that G. King had written up a specimen collected on Tonglo as *Osmanthus suavis,* adding "that it does not agree well with Osmanthus . . . but there appears no other place for it unless a new genus." Unwilling to propose a new genus, he widened the concept of *Osmanthus* "considerably . . . from that of Gen. Pl. (II. 677) to include *O. suavis* King."

* Evidently the Ridha of modern maps, a village below the Pele-La (90° 10′ E.).

When a few years later (1886) Franchet described his *Osmanthus Delavayi*, a species evidently closely allied to King's *O. suavis*, he was equally embarrassed, and to escape the necessity of proposing a new genus he created a new subgenus, *Siphosmanthus*, for the plant in question. To my mind neither Clarke's nor Franchet's decision solves the problem. The two species *O. suavis* and *O. Delavayi* constitute a natural group which is admitted to be distinct from the group of which *Osmanthus fragrans* is, structurally and nomenclatorially, the prototype. The distinctive characters are given in italics in the Latin diagnosis at the head of this article. They are at least as marked as those which are used to separate *Osmanthus* (sens. str.) from the Mediterranean genus *Phillyrea*. If we were to follow Clarke and Franchet we should, from the standpoint of formal logics, have to sink the original *Osmanthus*-group and Franchet's *Siphosmanthus* in *Phillyrea*. Nor could we stop there. In these circumstances it seems more rational to accept *Siphosmanthus*, or as I prefer to call it—for linguistic reasons—*Siphonosmanthus*, as a genus ranking with *Osmanthus* (sens. str.), *Phillyrea*, *Notelaea*, *Olea*, etc.

We are indebted to the Marquis of Headfort for the material from which this plate was prepared. He assures us that the shrub is quite hardy in his garden at Headfort House, Kells, Co. Meath, where it flowers in midwinter. It is, owing to its larger leaves, more ornamental than *S. Delavayi* but perhaps not so free-flowering. Like its congener, it is sweet-scented.

Description.—An almost glabrous evergreen polygamous-dioecious *shrub* or small tree up to 4 m. high ; young branches minutely puberulous, soon warty, bark rough, greyish. *Leaf-blades lanceolate to lanceolate-oblong* from a shortly acute or almost blunt base, *sharply acute or acuminate*, closely crenate-dentate (with the crenae more depressed than shown in the drawing) and finely cartilaginous along the margin, *3–7 cm. by 1·5–2·5 cm.*, leathery dark-green and shining above, pale and minutely punctate on the back, lateral nerves 5–8 on each side, slender ; petiole 5–7mm. long, somewhat stout, minutely puberulous. *Flowers* few to 8 *in sessile or subsessile axillary clusters*, which are supported by about 4 pairs of closely imbricate bracts; these broad-

ovate, acute, herbaceous, green, up to over 3 mm. long; pedicels up to 5 mm. long, slender, minutely puberulous. *Calyx* cup- to bell-shaped, deeply and often irregularly lobed, 4 mm. long, lobes hyaline upwards, ciliolate, whitish or slightly suffused with purple. *Corolla* white; tube 6–9 mm. long, as in fig. 4; lobes elliptic ovate, obtuse, 3–4 mm. long, ciliolate. *Anthers subsessile just below the mouth of the corolla*, exserted, apiculate, up to over 2 mm. long. *Style* of ♀ flower 4 mm. long; stigma capitate. *Fruit* globose-ellipsoid, 9–11 mm. by 6–8 mm., bluish-black; mesocarp thin, fleshy; endocarp crustaceous. *Seed* solitary, up to 9 mm. by 5 mm.

Distribution. North India; Sikkim, Bhutan and mountains of Manipur.

O.S.

Fig. 1, a flowering branch (♂) nat. size; 2, a portion of a leaf (back), × 4; 3, a small cluster of flowers, × 3; 4, a single flower, the bracts removed from the peduncle, × 3; 5, longitudinal section of a ♂ flower, × 3; 6, a corolla, cut open and expanded, × 3.

L.Snelling del.et lith.

Tab. 9177.

ACACIA RHETINODES.

Australia.

Leguminosae. Tribe Acacieae.

Acacia, Willd.; *Benth. & Hook. f., Gen. Plant.* I. 594; *Taubert in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 108.

Acacia rhetinodes, *Schlechtendal in Linnaea*, XX. 664 (1847) *et in Bot. Zeit.* XI. 893 (1853); inter "*Racemosas*" Australiae Orientalis juxta *A. neriifoliam*, A. Cunn. posita et ei habitu simillima, sed calyce ad vel utra medium gamosepalo, ovario glabro, funiculo perlongo semen plica duplici ambiente bene distincta.—F. Mueller in Journ. Linn. Soc. III. 126 (1859) et Pl. Vict. II. 13 (1865) et Iconogr. Austral. Sp. Acacia, Dec. V. (1887); Bentham, Fl. Austral. II. 362 (1864) et in Trans. Linn. Soc. XXX. 468 (1875); de Noter in Belge Hort. XXXIII. 201 (1883); R. Tate, in Trans. Roy. Soc. S. Austral. XII. 65, 88 (1889) et XIII. 117, 119 (1890) et Flor. Extra Trop. S. Austral. 76 (1890); Vilmorin in Journ. Roy. Hort. Soc. XVI. 85 (1894); E. Sauvaigo, Cult. Litt. Med. 6 (1894); Mottet in Rev. Hort. 1896, p. 505, fig. 175; Bellair & St. Leger, Pl. Serre, 87, 88, fig. 33 (1900); Diels, in Engler Drude, Veg. der Erde, VII. 12, 14 (1906); Pottier fils in Jardin, XXII. 72, fig. 39 (1908); Gubb, Fl. Alger. t. 60 (1909); Guilfoyle, Austral. Pl. 38, 136 c. ic. (1911); R. Hickel in Bull. Soc. Dendr. France, 1913, p. 195, 196, fig. 65 d; Buysman in Flora, CVI. 103 (1913); E. Gadeceau in Rev. Hort. 1914, p. 139, fig. 37; Ponzo in Nuov. Giorn. Bot. Ital. N.S. XXV. 286 (1918); E. E. Pescott in Journ. Dep. Agric. Vict. XVII. 426, 429, c. ic. (1919); Gard. Chron. Ser. 3, LXV. 163, fig. 68 (1919); J. M. Black, Flor. S. Austral. 277 (1924); R. H. Cambage in Journ. Roy. Soc. N. S. Wales, LX. 85, 88 (1927).

Syn. *A. retinoides* var. *floribunda*, Vilmorin in Journ. Roy. Hort. Soc. XVI. 84, fig. 2 (1894).

A. floribunda Hort. ex Nichols. Dict. Gard. "1900," Suppl. p. 4 (1900), non Willd.

A. fragrans Hort. ex Pottier f. in Jardin, XXII. tab. ad p. 72, fig. 2 (1908); non Ten.

This acacia, one of the most valuable of the "mimosas" of the florists, became first known through Schlechtendal, who in 1847 published an account of a collection of plants obtained by Dr. Hermann Behr in the neighbourhood of Adelaide, where, according to Behr, it is a common middle-sized tree in the fertile soil of the valleys. It was then known to the colonists as "silver-wattle" and as a gum-yielding tree, hence the specific name "rhetinodes" (not "retinodes" as Schlechtendal wrote). F. v. Mueller and others have since proved its more general occurence on both sides of Spencer Gulf as far as Flinders Range. In Victoria *A. rhetinodes* is widely represented by a form with slightly broader phyllodes with more markedly cartilaginous margins and with corollas

whose base is more rigid and usually red. The species was apparently first introduced to cultivation in Algeria, as small plants, planted there in 1871, are mentioned. It became at the same time or soon afterwards established on the French Riviera, where it is now, next to *A. dealbata*, the commonest acacia. It is, in gardens, often misnamed *A. floribunda* or *A. fragrans*, names which must not be confused with the corresponding homonyms of Willdenow and Tenore. Its long, though not always certain, flowering during November and December makes it a commercially valuable "mimosa," surpassed only by *A. dealbata*. In this country it has proved hardy at Leonardslee in Sussex and more generally in the south-west. Otherwise it is a free-growing greenhouse-shrub or tree. Tall specimens of it may be seen in the Temperate House at Kew, whence the model of our plate was taken.

Robert Brown's specimens from Port Phillip (Victoria) and Memory Cove (South Australia, Co. Flinders), which in Flora Australiensis are quoted under *A. rhetinodes*, belong evidently to some other species. The former has a densely villous ovary and the latter broader lanceolate phyllodes, mostly 6 cm. by 1·2–1·3 cm., stouter shorter peduncles and smaller flowers with minute anthers and a papillose ovary. *A. rhetinodes* has also occasionally been confused with *A. neriifolia*, a more eastern species of a very similar habit, but it can readily be distinguished from it by its glabrous ovary and its long doubled up funicle. The short funicle of the seed of *A. neriifolia* is shown in fig. 10 of our plate which, along with figs. 8 and 9, was accidentally included.

Description.—A glabrous *tree* up to 10 m. high ; branches minutely papillose, triangular or upwards much compressed and ancipitous, later becoming almost terete, with the angles remaining as ridges. *Phyllodes* linear to linear-lanceolate or lanceolate, slightly falcate, acute ending in a minute oblique sharp point, or occasionally obtuse, 6·5–16 cm. by 0·4–1·7 cm., with the nectarial gland up to 1·2 cm. from the base, one-nerved ; lateral nerves obscure, glaucous. *Flower-heads* fragrant, globular, stalked, disposed in terminal more or less glandular, usually somewhat lax panicles, the individual racemes of which are sometimes compound and up to 5 cm.

long, composed of up to 45 flowers, these globose in bud and 5–6 mm. in diameter; bracteoles peltate, their blade suborbicular, densely fringed with cilia. *Calyx* turbinate, about 1 mm. high, thin, broadly 5-lobed, *the lobes either very short or up to one third the length of the calyx*, obtuse, tips thickened and fringed with cilia. *Petals* oblanceolate, 2 mm. long, united for a short distance at two thirds from the base, glabrous. *Stamens* very numerous; filaments about 4 mm. long. *Ovary glabrous*, up to almost 1 mm. long; style 2–3 mm. long. *Pod* linear or slightly curved, flattened, up to 12 cm. long, by 6 mm. broad, very slightly constricted between the seeds. *Seeds* oblong in outline, somewhat compressed, brownish-black, smooth, 5 mm. long by 2·5 mm., 1–1·5 mm. thick; *funicle* dilated at the base, but soon thinning off and *extending around the seed almost completely, but abruptly bending back again and so encircling the seed in a double fold.*

DISTRIBUTION.—Australia, South Australia and Victoria.

O.S. & F.B.

Fig. 1, flowering branch, nat. size; 2, phyllodial gland, × 7; 3, flower, × 7; 4, calyx, opened × 7; 5, petals, × 12; 6, stamen, × 15; 7, pistil, × 12; 8, pod of *A. neriifolia*, nat. size; 9, a valve of the same, seen from within, nat. size; 10, seed (with short funicle) of the same, nat. size.

G Ashburner et W.T. Greythuck del. L. Snee g lith.

Tab. 9178.

SALVIA CAERULEA.

South America.

Labiatae. Tribe Salvieae.

Salvia, Linn.; *Benth. & Hook. f. Gen. Plant.* II. 1194; *Briquet in Engl. & Prantl, Nat. Pflanzenf.* IV. 3a. 270.

Salvia caerulea, *Benth. Lab. Gen. & Spec.* 298 (1833) *et in DC. Prodr.* XII. 330 (1848); inter "*Nobiles*" (Sect. *Calosphaces* subsect. *Longiflorarum* Benth.) florum colore pulcherrime caeruleo distinctissima; "*Cyaneis*" (eiusdem sub-sectionis) quibusdam, *e.g.*, *S. mexicanae*, Linn., habitu persimilis, sed corollae tubo sursum sensim dilatato, haud ventricoso, distincta.—Schmidt in Mart. Fl. Bras. VIII. I. 194 (1858); Briquet in Engl. & Prantl, l.c. 282 (1896); Hicken, Chlor. Plat. Argent. 201 (1910); Gard. Chron. Ser. III. LXXX. 302 (1926); Journ. Roy. Hort. Soc. LII. p.cii (1927).

Syn.: *S. ambigens*, Briquet in Bull. Soc. Bot. Genève, V. 120 (1889) et in Micheli, Contr. Fl. Parag. VII. 8. t. 55 (1897) et in Bull. Herb. Boiss. Sér. 2, VII. 611 (1907); Chodat & Hassler, Aperçu Géogr. Bot. Parag. 21 (1911).

? *S. guaranitica*, St. Hil. ex Benth. ll. cc.; Schmidt, l.c.; Briquet, l.c.—Vide infra.

? *S. rhinosima* Griseb., Pl. Lorentz. in Abh. K. Ges. Wiss. Götting. XIX. 239 (1874) excl. var.—Vide infra.

We are indebted for the communication of this beautiful sage to Mrs. A. Martineau, of Broom Hall, Sunningdale, Berks, who informs us that she raised the plant from seed received from Mme. de Langlois of Santiago in Chile. According to the latter it is commonly seen in Chile, that is, we assume, in gardens or as an escape from gardens. For it is not a native of that country. Chile is indeed very poor in species of *Salvia*, a genus so abundantly represented in the warmer parts of America. There are only two Chilian species on record, both confined to the arid litoral of the provinces Antofagasta and Atacama, one of them *S. tubiflora*, an elegant bush with felted leaves and red flowers, the other *S. paposana*, a slender, blue-flowered annual. The home of our plant is in eastern and south-eastern Brazil and in eastern Paraguay and probably also in north-western Argentine (Catamarca). Hicken also records it as growing in abundance in the neighbourhood of the city of Buenos Ayres. As none of the earlier writers on the flora of Buenos Ayres mentions this conspicuous plant, it may be, there, as in Chile, a recent introduction.

S. caerulea was discovered by Friedrich Sellow in "South Brazil" about 100 years ago, unless *S. guaranitica* * which

* *S. guaranitica*, so named after the Guarani, a tribe of Indians, was described by Bentham at the same time as *S. caerulea*. From his descriptions of the two species,

was collected by St. Hilaire in the "Misiones Orientales" of Rio Grande do Sul, in 1821, should actually prove to be specifically identical with it and therefore represent a still earlier record. *S. caerulea* was subsequently found in various parts of eastern Brazil as far north as 20° S. Lat., and in 1874 it was discovered by Balansa in the forests of Caagliazu in eastern Paraguay. Dr. Briquet, overlooking or mistaking *S. caerulea*, described Balansa's plant as a new species, *S. ambigens*, a name which was also given to later collectings made by Dr. E. Hassler in the same district and at Paraguari, S. E. of Asuncion, and in the "Yerbales" on the Sierra Maracayu, on the Brazilian frontier. T. Rojas found it a few years later in the Sierra Amambay, that is still further north on the same frontier. Hicken in his Chloris Platensis records *S. caerulea* also from Uruguay, but without quoting any definite localities. From the collectors' notes we gather that *S. caerulea* is in Brazil, as well as in Paraguay, a woodland plant, partial to clearings and roadsides. Of its occurrence in the neighbourhood of Buenos Ayres I have already spoken. Whether it occurs elsewhere in the Argentine is uncertain, but Grisebach's description of *S. rhinosima*, a native of Catamarca, where it is said to grow in "fruticetis umbrosis" suggests identity with our plant.

The plant, in its wild state is a perennial or undershrub. It can, however, be grown as an annual if sown under glass in the early spring and planted out, when it will flower in September and October. If sown in the autumn the flowers will be produced correspondingly earlier. At Ascot and Maidenhead it has survived the winter of 1925–26, but it can hardly be expected to resist severe frosts. As it seeds freely, propagation by seed ensures a supply of good strong plants, which in a broad border with sufficient space to

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they would appear to differ in the hairiness of the leaves and the style and in the size of the flowers. *S. guaranitica* is said to have rugose, hispid leaves, greyish-tomentose on the back, a bearded style and corollas 15–16 lin. long, whilst *S. caerulea* is credited with leaves shortly hairy or (rarely) hispidulous on the face and glabrous or finely pubescent on the nerves on the back, with corollas 18–24 lin. long, and with a glabrous style. As to the latter, Bentham was mistaken as the style of Sellow's originals is distinctly bearded, and as regards the other two differential characters, I find that the amount of hairiness fluctuates between wide limits as will be seen from the very full description given at the end of this article, whilst the sizes of the corollas practically pass into each other and are not correlated with any other character. I have, however, not seen St. Hilaire's specimen, and I would therefore leave the question of the identity of *S. caerulea* and *S. guaranitica* open for the present.

themselves and given enough water will make fine bushes up to over 1 m. high, in which the deep clear blue of the flowers and the vivid green of the leaves combine to produce a highly ornamental effect.

Description.—A *suffrutescent perennial*, up to 1·5 m. high, all the parts except the corollas usually a clear vivid green. *Stems* quadrangular, minutely pubescent with the hairs recurved and more or less appressed or more or less spreadingly hirsute, with or without gland-tipped hairs. *Leaves* stalked, spreading; blades ovate, from a rounded or more often almost truncate or cuneate-truncate base, acute or acutely acuminate, coarsely crenate with the crenae produced into a gland-tipped slightly incurved point, 5–12 cm. by 3–8 cm., of a dark vivid green, more or less rough on the face, owing to the presence of minute or elongated appressed hairs, paler on the back and shortly pubescent on the midrib and nerves or all over; stalk slender, up to 6 cm. long with the indumentum of the stem. *Inflorescences* up to 2·5 cm. long, of up to 10 or more 6–5-flowered false whorls (mostly 3–1·5 cm. apart), subsecund; bracts deciduous long before flowering, ovate-lanceolate, caudate-acuminate, up to 1 cm. long, membranous; pedicels 4–6 mm. long, articulated at their tips, minutely reversedly downy. *Calyx* tubular, widened upwards, up to 1·6 cm. long, bright green or more or less blue on the back, minutely downy to hispidulous, at least on the faintly raised nerves, more or less minutely glandular all over, and with or without dark blue dots; upper lip rotundate-ovate, acute or very shortly and acutely acuminate, about 6 mm. long; lower lip of about equal length, bifid, lobes obliquely ovate, shortly acutely acuminate, margins of both lips bluish, ciliolate. *Corolla uniformly dark to violet-blue* except at the whitish base, rarely blue-rose, 3·2–5 cm. long; tube long-exserted, laterally compressed, 1·5–2·5 cm. long, gradually widened upwards, not ventricose, glabrous without and within, upper lip about 1·2–1·5 cm. long, laterally much compressed, erect, slightly curved on the back, shortly 2-lobed, glandular-puberulous without, lower lip 1–1·2 cm. long, 3-lobed, lateral lobes laterally revolute, very obtuse, middle lobe concave, rotundate, 4 mm. long, glabrous without, except on the keel-line. *Filaments*

3 mm. long, glabrous; antheriferous arm of the connective ascending in the upper lip, glabrous, whitish, 9 mm. long; barren branch descending, 7 mm. long, blackish-blue with a whitish tip, glandular-puberulous. *Style* about 3·5 cm. long, loosely bearded for over 1 cm. from the tip downwards; stigmatic branches exserted, the upper filiform, blunt, dark-blue upwards. *Disc*-gland equalling the nutlets 2 mm. long, yellowish. *Nutlets* (mature) ellipsoid, up to 2·5 mm. long.

DISTRIBUTION.—South America, Eastern and South-eastern Brazil and Paraguay, naturalised in Argentine and Chile.

O. S.

Fig. 1, A leaf-branch; 2, one half of a large leaf; 3, an inflorescence; 4, a flower in side-view; 5, a flower with the lower lip cut off, in front view; 6, stamens; 7, nutlets, with the disc-gland in the background, × 3; 8, pistil, × 1·5. All natural size, except 7 and 8.

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Tab. 9179.

ENCYCLIA MOOREANA.

Costa Rica.

Orchidaceae. Tribe Kerosphaereae.

Encyclia Hook.; *Schlechter, Orchideen*, 207—*Epidendrum* sect. *Encyclia* sub-sect. *Hymenochila, Benth. & Hook. f., Gen. Plant.* III. 529; *Pfitz. in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 145.

Encyclia Mooreana, *Schlechter, Orchideen*, 210 (1915); affinis *E. stellatae* Schlechter, sed lobi labelli intermedii nervis haud incrassatis, lobis lateralibus subspathulatis obtusis, floris colore differt.—Schlechter in Orchis, IX. 83 (1915) et in Beih. Bot. Centralbl. XXXVI. II. 472 (1918).

Syn.: *Epidendrum Mooreanum* Rolfe in Kew Bull. 1891, p. 199, et in Gard. Chron. Ser. III. X. 215 (1891); Williams, Orchid Grower's Manual, Ed. 7, p. 387 (1894).

The genus *Encyclia* was first described by W. J. Hooker in this Magazine as long ago as 1828 (t. 2831), the only species being *E. viridiflora* Hook. Hooker compared the genus with *Cattleya*, but did not mention the genus *Epidendrum*, although he stated that *Encyclia* belonged to the tribe *Epidendreae*. Lindley at first (Gen. & Sp. Orch. 111, 1831) accepted the genus, but later (Hook. Journ. Bot. III. 81, 1840) reduced it to a section of *Epidendrum*, adding many more species. This treatment was accepted by subsequent authors, until Schlechter in 1915 resuscitated the genus *Encyclia*, which he also adopted in later works. The genus as now consituted, however, does not coincide with Lindley's section *Encyclium* of *Epidendrum*, but only with the subsection *Hymenochila*, in which the lip is three-lobed. The genus is separated from *Epidendrum* by Schlechter on account of the lip being free from the column or united to it only at the base and on account of the small clinandrium. The habit of the genus is very uniform, the short pseudobulbs bearing 1–3 leaves and a terminal raceme or panicle of moderate-sized flowers. The geographical distribution of *Encyclia* is very similar to that of *Epidendrum* except that the greater number of its species are found in Central America and the West Indies, whereas the majority of epidendrums come from the South American continent.

Encyclia Mooreana is a native of Costa Rica, whence it was imported into this country about 1888–9. It was first sent to Kew in 1889 by Mr. (afterwards Sir) F. W. Moore, Curator

of the Royal Botanic Garden, Glasnevin, Dublin, and was afterwards received from several other sources. Unfortunately nothing is known of the distribution of the plant in Costa Rica or of its habitat. Its nearest relative is apparently *E. stellata* Schlechter, a native of Venezuela, which, however, has larger flowers with green perianth-segments and a white lip bearing several thickened veins. The lateral lobes of the lip are also much more acute, and wider at the base than towards the apex.

E. Mooreana is grown at Kew in a house in which a temperature of 50–55° F. is maintained during the winter months, and the temperature is kept as low as possible during the summer. During the winter resting-period the plants are kept fairly dry at the root, but when growth commences a liberal supply of water is needed. They are potted in a compost of Osmunda-fibre and sphagnum.

The specimen from which our plate was prepared flowered at Kew and was received from Mr. C. H. Lankester of Costa Rica in 1920. There is also another specimen sent in 1924.

Description.—An epiphytic *herb* with closely placed, almost conical or ovoid, smooth and shining pseudobulbs, 3–4 cm. long, covered at the base with several brown sheaths and furnished with rather fleshy whitish smooth roots. *Leaves* 2 to each pseudobulb, linear, acute or sometimes obtuse, 20–50 cm. long, 1–2 cm. wide, the longer ones drooping, rather fleshy and smooth, the margins slightly curled back, very slightly narrowed at the junction with the pseudobulb. *Inflorescence* a simple panicle with the branches rather zig-zag, the whole reaching to a height of 45 cm. or more; rhachis bearing 2–5 branches, slender, glabrous, with several short scarious sheathing bracts below. *Flower-stalks* slender, spreading or even slightly deflexed, 1·5–2·5 cm. long; bracts very short, triangular, acute. *Sepals* oblanceolate, subacute, 11–14 mm. long, in the upper part 2–3 mm. wide, *pale green with a few purple spots on each edge in the lower part*, turning yellowish with age. *Petals* subspathulate, subacute or obtuse, 10–13 mm. long, in colouring similar to the sepals. *Lip* deeply three-lobed, 10–12 mm. long, *side lobes* folded over the column, *oblong-spathulate*, rounded at the apex, about 6 mm. long, *bright*

reddish-purple, middle lobe pentagonal-ovate or broadly ovate from a short claw, rounded, 7–9 mm. long, 6–7 mm. wide, *with a white margin and a broad almost circular band of reddish purple within*, the claw with two low longitudinal ridges, white or yellowish. *Column* flattened in front, 6 mm. long, with a short horn on each side at the apex, pale purple below on the sides, anther cap yellow.

DISTRIBUTION. Costa Rica.

V. S. SUMMERHAYES.

Fig. 1, lower part of a plant, nat. size; 2, inflorescence, nat. size; 3, node of inflorescence, nat. size; 4, labellum, × 3; 5, column with perianth removed, × 6; 6, 7, and 8, pollinia in front, back and side views, × 7.

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TAB. 9180.

COSMOS DIVERSIFOLIUS.

Mexico.

COSMOS, Cav.; *Benth. & Hook. f. Gen. Plant.* II. 387; *Hoffmann in Engl. & Prantl, Nat. Pflanzenf.* IV. 5. 245.

Cosmos diversifolius, *Otto in Knowles & Westcott, Flor. Cab.* II. 3, t. 47 (1838); arcte affinis *C. atrosanguineo,* Stapf (nov. comb. ex *Bidente atrosanguineo,* Ortgies), qui vero foliorum segmentis latioribus, lateralibus plerumque elliptico-oblongis vel ovatis, floribus radii atque disci atrorubris, iis radii pro rata latioribus, achaeniis maturis tenuioribus ad 2 cm. longis distat.—Hérincq in Horticult. Franç. Sér. 2, III. 60 (1861); Hemsley in Biol. Centro-Amer. II. 199 (1881–2); Sherff in Bot. Gaz. LVI. 494 (1913).

Syn. *C. reptans,* Benth., Pl. Hartweg. 40 (1839).

Bidens diversifolia, Schultz-Bip. in Seem., Bot. Voy. Herald, 308 (1856).

B. reptans, Schultz-Bip. l. c.

B. dahlioides, S. Wats. in Proc. Amer. Acad. XXVI. 142 (1891); W. I. (Irving) in Gard. Chron. Ser. III., XLVIII. 226, fig. 89 (1910); Gumbleton, ibid. 250 (1910); Mottet in Rev. Hort. Nouv. Sér. X. 475, fig. 199 (1910) et XI. 93, fig. 27 (1911); A. Purpus in Möllers Deutsche Gärtn. Zeit. XXVI. 184, c. ic. (1911); Journ. Roy. Hort. Soc. XXXIX, Proc. p. cxlix (1914); J. in Gard. Chron. Ser. III., LXXVIII. 88 (1925).

This handsome composite became first known through Friedrich Otto, the able Curator of the Botanic Garden of Berlin, who in 1835 sent a plant under the name adopted here to the Birmingham Botanic Garden where it flowered three years later, when it was briefly described and figured in Knowles & Westcott's Floral Cabinet. No indication of its native country or the collector was given. It seems to have been soon lost to cultivation and to literature. It is therefore not surprising that Sereno Watson when elaborating a part of C. G. Pringle's Mexican collections of 1889 and 1890 overlooked Otto's name and redescribed the plant as *Bidens dahlioides.* Pringle's specimens came from Flor de Maria (2,500 m.) in the north-west of the State of Mexico and approximately in the centre of the area of the species, which extends, as far as we know at present, from Chihuahua to Oaxaca, that is, throughout the Mexican plateau, with a vertical range of 2,250–2,650 m. Although our plant was repeatedly collected before and after Pringle, its reintroduction to cultivation dates only from 1907 and 1908, when the brothers Purpus

supplied the Botanic Garden at Darmstadt with seed from Mexico. A. Purpus, the late Curator of the garden, collected it at Boca del Monte (2,420 m.) near Orizaba, where it occurs,* scattered or collected in groups, in the short sward of the meadows of the escarpment of the Central-Mexican plateau. Purpus found it not quite hardy at Darmstadt. It has to be covered in the winter or, still better, taken up before severe frost sets in and kept in a cool, but not too dry place until the next spring. It seeds freely and if sown not too late may flower the first year. It thrives in any light gritty soil, but it requires a sunny situation. In the milder parts of this country it has been known to persist without the tubers being lifted.

In garden literature our plant has of late mostly been referred to *Bidens*, but Earl E. Sherff, the monographer of this genus, has already (1913) pointed out, that "from the involucre, the ligules and the frequently occurring prostrate achenes, it is seen to be a true species of *Cosmos*." More debatable is its relationship with the plant, with which I have compared it in the differential diagnosis given above and for which I propose the new combination *C. atrosanguineus*. This became known almost simultaneously as *Cosmos diversifolius* var. *atrosanguineus* Hook. (January 1861) and as *Bidens atrosanguineus* Ortgies (December 1861). The earlier publication, in this Magazine under t. 5227, was based on a plant raised from Mexican seed by Mr. Thompson of Ipswich, the later, in Gartenflora X. t. 347, on a large suite of specimens, obtained from seed which B. Roezl had, in 1860, sent to E. Ortgies of the Botanic Garden at Zürich under the name *Dahlia Zimapani*.** Hooker had incomplete material to deal with and therefore preferred "adopting Otto's name rather than encumber the system with new but doubtful species." Ortgies, on the other hand, was placed in a better position for observation and his conclusion, that the original white or pink-flowered *C. diversifolius* and the dark-flowered "variety" *atrosanguineus* should be considered as specifically distinct, has therefore considerable weight. It has since also been supported by A. Purpus, and I may add that a

* This is the district whence in the early thirties of the last century the Berlin Botanic Garden received, through Dr. Schiede, so many interesting plants, and we may safely assume that Otto's *Cosmos diversifolius* was one of them.

** *Dahlia Zimapani*, so named after Zimapan, a town in the Mexican State Hidalgo, where Roezl collected it.

sample of ripe achenes, communicated by Thompson to Hooker along with some flowers, emphasizes the distinctiveness of the two kinds, in as far as the achenes are much longer and slenderer than in any specimen of *C. diversifolius* I have seen.

Our plate was drawn from specimens kindly communicated by the Director of the Botanic Garden at Cambridge.

Description.—A perennial glabrous *herb* (rarely here and there shortly hairy on the stems and petioles) with tufted foliage and long scape-like flowerstalks, including these up to over 50 cm. high. *Roots* tuberous, several from a short rhizome, roundish or elongated, 1·5–4 cm. long. *Stems* more or less branched low down, smooth. *Leaves* very variable, opposite, borne on slender stalks up to 12 cm. long ; lowermost entire with *lanceolate or oblanceolate blades* up to 6 cm. by 2·5 cm. and gradually decurrent on the stalk, the following tripartite- or simply-pinnate or pinnatifid with 1–5 pairs of somewhat distant *linear-lanceolate to oblanceolate, mostly acute lateral leaflets or segments up to 4 cm. by 0·3–1·2 cm.* and with a larger oblanceolate to obovate or rhomboid, sometimes toothed or 3-lobed terminal segment. *Peduncles* terminal on the main axes and branches, erect, slender, up to over 40 cm. long. *Flower-heads* 4–6·5 cm. across ; involucral bracts in two series, the outer of about the same number as the ray-florets, herbaceous, green or suffused with purple, with numerous dark parallel veins, lanceolate to ovate-oblong, acute, 1–1·5 cm. by 0·3–0·5 cm., the inner alternating with them, similar but rather thinner and paler ; floral bracts similar to the involucral, but narrower and more scarious up to 1 cm. long, the outer surrounding the disc-florets like an inner erect involucre. *Ray-florets* 7–9, sterile ; corolla-limb spreading almost horizontally, *obovate-oblong*, obtuse or subacute, *entire or rarely one or the other more or less irregularly* 2–3-toothed, 3 cm. by 1·5 cm., *pure white to rose*, tube pubescent. *Disc-florets* ♀ ; *corolla yellow*, tube tubular-campanulate upwards, pubescent without below. *Anthers* 3 mm. long, brown. *Mature achenes* slightly curved, linear, narrowed at both ends, ribbed, very minutely scabrid, *up to 1 cm. long* ; pappus of 2 or 3 suberect rigid barbed bristles, up to almost 2 mm. long.

DISTRIBUTION.—Mexico, throughout the Central Plateau, 2,250–2,650 m.

O.S.

Fig. 1, a flowering plant; 1a, a flower-head in back-view; 2 an outer; 3, an inner involucral bract; 4, a floral bract (palea) of the "inner involucre" surrounding the disc; 5, a disc-floret with supporting palea; 6, a mature achene; all nat. size except 5 (× 4) and 6 (× 3).

W.E.Trevithick del. L.Snelling lith.

TAB. 9181.

BRIGGSIA AMABILIS.

China.

GESNERACEAE. Tribe CYRTANDRACEAE.

BRIGGSIA, *Craib in Notes Bot. Gard. Edinb.* XI. 236.

Briggsia amabilis, *Craib in Notes Bot. Gard. Edinb.* XI. 263 (1919); arcte affinis *B. Kurzii*, W. E. Evans, sed minor, imprimis foliis minoribus, omnibus partibus multo minus pilosis inflorescentia depauperata differt.—W. E. Evans in Notes Bot. Gard. Edinb. XVI. 133 (1928).

Syn. *Didissandra amabilis*, Diels in Notes Bot. Gard. Edinb. V. 224 (1912); Léveillé, Cat. Pl. Yunnan, 123 (1915-17).

In an article in Notes from the Royal Botanic Garden, Edinburgh, XI. No. LV (1919), Professor W. G. Craib has given cogent reason for the reduction of the genus *Didissandra*, as understood until then, to a group of about 16 species with small to medium-sized flowers possessing anther-cells, which diverge and dehisce at right angles to the filament, the latter finally coiling up spirally and withdrawing the anthers well down into the corolla-tube. The residue he distributes over three new genera of which *Briggsia* is one. It has, like the other two segregates, anthers whose cells and lines of dehiscence are approximately parallel to the filament which is not spirally retracted, but it differs from them in the gradual inarching of the filaments, in the marked anticous inflation of the corolla-tube and the distinct lobing of the upper lip. *Briggsia* appears to be a natural group of about 15 species, with two exceptions confined to Yunnan and Kweichou, the exceptions being *B. Kurzii* from Sikkim and *B. speciosa*, from Hupeh. A good illustration of the type represented by *Briggsia* may be found in Hooker's Icones Plantarum, t. 2379 under *Didissandra longipes* (now *Briggsia longipes*). We have now much pleasure in adding a coloured picture of another species of a somewhat different habit. For the opportunity of doing this we are obliged to Mr. E. J. P. Magor of Lamellan, St. Tudy, Cornwall, in whose garden our plant

appeared among a sowing of rhododendron seed (Forrest no. 21,487). This seed was obtained " on open moorland among dwarf scrub and rocks on the Chien-Chuan-Mekong divide, Lat. 26° 40′ N. Long. 99° 40′ E. Alt. 12–13,000 ft., July, 1922." It is practically the same locality where Forrest collected in the same summer good flowering specimens (nos. 22,282 and 23,210) which tally well with Mr. Magor's plant except that they have larger, more inflated flowers and leaves, which are grouped so as to form almost a single whorl. Other records locate *B. amabilis* on the eastern flank of the Lichiang range (Forrest 2,689), on the Tali range (Forrest 4,385 and 6,893) and in the neighbourhood of Muli in S.W. Szechuan in 27° 50′ N. and 101° E. (Forrest 22,460). The habitat is described as " shady banks " or as " damp rocks, cliffs and trees in shady situations " at altitudes of 2,700–3,300 m. and the colour of the corolla as light yellow to dull orange with purplish- to brownish-orange markings. Craib distinguished the specimens from the Tali range as var. *taliensis*, but they appear to be hardly more than weak states of the typical form.

Craib, in his key to the species of *Briggsia*, places *B. amabilis* next to *B. Cavaleriei*, a species of southern Kweichou, which according to him differs in having much smaller calyces (6 mm. long) and crenulate leaves with a down of mostly capitate hairs on the back. Very much closer is the affinity with *B. Kurzii*, as Mr. W. E .Evans has recently pointed out. In fact, he described *B. amabilis* as " merely a geographical modification of the same species (*B. Kurzii*), usually of shorter and more slender stature, its upper parts and especially the inflorescence generally rather less hairy, with as a rule fewer flowers and these having perhaps relatively wider corollas," and he suspects that *B. amabilis* will ultimately have to be regarded as synonymous with *B. Kurzii*. Although the great resemblance between the two species is undeniable, I would, with the ample material before me, not go so far. They are distinct units with a different distribution and require, therefore, a distinctive designation.

A specimen communicated by Mr. Magor, when his plants first came into flower, was dwarf with the largest leaf 4 cm. by 2·5 cm. and with the corolla tube 3 cm. by 1·7 cm. The flowers were normal and of a richer colouring than shown in the plate. Next year's growth was considerably larger, but many

of the flowers were abnormal in so far as the lower lip was 2-lobed. One of these plants is shown in fig. 1.

B. amabilis requires moist air and protection from strong sun-light. It cannot be expected to be hardy in our climate, but the usual conditions of a greenhouse will suit it. Mr. Magor's plants produced seeds; these, however, mildewed.

Description.—A *perennial* glandular-pubescent *herb*, 15–25 *cm. high* with a slender creeping rhizome. *Stem* more or less upright, bare to high up, terete, *loosely villous* with fine many-celled gland-tipped hairs, often mottled. *Leaves* in the field-specimens crowded towards the top of the stem, often forming a false whorl, in cultivated specimens in distinct pairs; blades very unequal in size, the larger (3–4) ovate-elliptic to elliptic-lanceolate from a rounded and often narrowed base, frequently more or less asymmetrical, acute, crenate or serrate all along or from above the entire base, *up to 12 cm. by 6 cm.*, thinly herbaceous, dark green and *loosely hairy* and glandular on the face, pale or purple and glabrous on the back; petioles 8–2 mm. long. *Flowers solitary or in 2 to 3-flowered cymes*, pendulous on slender 2-bracteolate pedicels, these up to 4 cm. long; bracteoles small, subulate, often with a minute rudimentary flower-bud in their axils. *Sepals* equal, narrowly lanceolate, finely acuminate, up to 1·5 cm. long, thinly herbaceous, very sparingly hairy. *Corolla* widely tubular, 2-lipped, cream-coloured to greenish (cult. spec.) or dull orange, with seriate spots on the ventral side, the spots brownish- or purplish-orange within; tube 2·5–3·5 cm. long, 1·2–1·7 cm. wide; upper lip 2-lobed, lobes rotundate, 5–7 mm. by 7–8 mm.; lower lip 3-lobed (abnormally 2-lobed), lobes equal, slightly smaller than those of the upper lip. *Anthers* enclosed, cordate-ovate, yellow. *Disc* annular, obscurely 5-grooved. *Ovary* subcylindrical, sparingly hairy, up to 1 cm. long; style 1·5 cm. long, very minutely hairy; stigma capitate, obscurely 2-lobed. *Fruit* unknown.

Distribution.—China. North-west Yunnan and adjoining Szechuan.

O.S.

Fig. 1, top of a flowering plant, nat. size ; 2, bracteoles with rudimentary flower-buds, × 6 ; 3, a normal short-tubed flower, nat. size ; 4, an abnormal flower with 2-lobed lower lip, nat. size ; 5, flower cut open, with lower lip, nat. size ; 6, back of tube and upper lip, nat. size ; 7, stamens in front and back-view, × 8 ; 8, same in side-view, × 8 ; 9. stamens in their natural position, ×8.

L. Snelling del. et lith.

Tab. 9182.

POTENTILLA NEPALENSIS.

India.

Rosaceae. Tribe Potentilleae.

Potentilla, Linn.; *Benth. & Hook. f., Gen. Plant.* I. 620; *Focke in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 34.

Potentilla nepalensis, *Hook. Exot. Fl.* II. t. 88 (1824); *P. Thurberi*, A. Gray, speciei Boreali-Americanae, similis, sed eglandulosa et foliis radicalibus quinatis, petalis calycem multo superantibus diversa; a speciebus Asiaticis gregis *Haematochroarum* (*P. argyrophylla* et *atrosanguinea* Auctorum) foliis quinatis facie subglabris dorso laxe pilosis satis distincta.—Lodd. Bot. Cab. XI. t. 1031 (1825); Seringe in DC. Prodr. II. 579 (1825); Morris, Fl. Conspicua, t. 33 (1826); M. Roscoe, Floral Ill. Seasons, t. 24 (1829–31); Nees & Sinning, Samml. Schönbl. Gew. t. 93 (1831); Lehmann, Rev. Potent. (Nov. Act. Nat. Cur. XXIII. Suppl.) 91 (1856) incl. vars.; Klotzsch & Garcke, Bot. Ergebn. Reise Pr. Waldemar, 156 (1862); Hook. Fl. Brit. Ind. II. 355 (1878); Collett, Fl. Siml. 165, fig. 46 (1902); S. Arnott, in Gard. Chron., Ser. 3, XXXIV. 351 (1903) et LXXV. 8 (1924) et LXXVIII. 88 (1925); Wolf, Mon. Gatt. Potent. (Bibl. Bot. XVI) 223 (1908); L. H. Bailey, Stand. Cycl. Hort. V. 2,774 (1916); Basu, Ind. Med. Pl. 524, t. 395 (1918); Coventry, Wild Fl. of Kashmir, Ser. 2, 37. t. XIX (1927); Blatter, Beaut. Fl. Kashmir, I. 106. t. 21. fig. 3 (1927).

Syn. *P. colorata*, Lehm. Ind. Sem. Hort. Hamburg. 8 (1821 nomen solum) et in Nov. Act. Ac. Nat. Cur. XIV. 2. p. 817 (1829).

P. formosa, D. Don, Prod. Fl. Nepal. 232 (1825); Sweet, Brit. Fl. Gard. II. t. 136 (1825); Maund's Bot. Gard. II. 157 c. ic. (1827); Sprengel, Syst. Veg. IV. cur. post., 199 (1827); Jaume St.-Hilaire, Fl. & Pom. France, II. t. 181 (1829); Ann. d. Blumist. V. 237 (1829) et VIII. t. 5 (1832).

P. bifurcata, Wall. Cat. No. 1,027, Blinkworth, Kumaon (1828, nomen).

P. coccinea, Hoffmeister, Trav. in India, 511 (1848).

P. Guilelmi-Waldemarii, Klotzsch ex Lehmann, Rev. Pot. 92 (1856); Klotzsch & Garcke, l. c. t. 13 (1862).

In the Flora of British India the distribution of this interesting and handsome plant is given thus—"Western temperate Himalaya, alt. 5–9,000 ft. from Murree to Kumaon." It would therefore appear that the specific name of the species, *nepalensis*, is a misnomer. There is, indeed, no Nepal specimen of it in Wallich's collection, and no mention of it in his Catalogue, *P. nepalensis* being represented in Wallich's herbarium and Catalogue only by a specimen, collected by R. Blinkworth in Kumaon and named *P. bifurcata*. Nor does it seem to have been collected or observed by one of the few collectors of Nepalese plants of more recent date. Yet, the elder Hooker when describing the plant stated (1824) definitely that "its seed had been received by Dr. Graham (Robert

Graham, Professor of Botany at Edinburgh) from Nepal, whence it had been transmitted by Wallich," whilst D. Don, who redescribed (1825) the plant as *P. formosa*, quotes Gosainthan, North of Kathmandu, as the locality of origin. In addition to this I may mention that the plant was already in 1820 in cultivation in the Botanic Garden at Hamburg, where Lehmann named it *P. colorata*, enumerating it eventually (1821) as of Nepalese origin. Other potentillas from the same country, as *P. atropurpurea* and its allies, were at about the same time introduced into European gardens through the East India Company, in whose employment Wallich was, or through private channels. They, like our plant, were no doubt part of the spoil of the native collectors whom Wallich employed previous to his own visit to Nepal in 1820. The flora of Inner Central Nepal has, indeed, so much in common with that of Kumaon, that the occurrence of *P. nepalensis* in Nepal might safely be anticipated. Westwards our plant extends as far as Hazara, North-west Frontier Province. It is confined to the outer Himalaya and to altitudes of 1,650 m. (Murree, Rawulpindi District) to 5,000 m. (Kidharkanta, Garhwal), but occurs most commonly between 1,800 and 3,000 m. It prefers sunny, grassy hillsides and open woods. Usually 30–50 cm. high, it is drawn up to more than 1 m. in height, if growing among tall herbage. On the other hand, it may become prostrate in dry situations with the leaves and flowers much reduced in size, the latter measuring barely 1·5 cm. in diameter, instead of 2·5–3 cm. which is their normal dimension. Such specimens were distinguished as varieties (*minor* and *prostrata*) by Lehmann. The colour of the petals is always a clear rose-red (Ridgways Col. Stand.) of varying depth ; but Gamble once collected a white-flowered form. This colour of the flower and the 5-foliolate sparingly hairy basal leaves distinguish our species very clearly from the very similar claret-red flowering forms of *P. atrosanguinea*, whose leaves are typically ternate and always densely white-tomentose on the back. In the constancy of the colour of its flowers, *P. nepalense* contrasts strongly with the forms which constitute the *P. argyrophylla* of the Flora of British India. These exhibit all transitions from red to yellow, the extremes being a deep claret-red and a pure golden yellow, the variations being due to the presence or absence of anthocyanine in the epidermis-cells of the petals, the anthocyanine, if developed,

overlying more or less the uniformly present yellow plastids of the epidermis and of the subepidermal parenchyma. No such plastids occur in *P. nepalensis*. Space forbids a discussion of the theoretical and practical problems involved in dealing with the "*argyrophylla*"—or, as it should be called, "*atrosanguinea*"-group. Botanists have treated it sometimes as a single species (*P. argyrophylla*; J. D. Hooker in Flora of British India) or as consisting of two species (*P. atrosanguinea* with red, and *P. argyrophylla* with yellow flowers; Wolff) or they have admitted within it a greater and varying number of specific units, mainly based on the hair-covering of the leaves, the colour of the flowers and the habit of the plant, characters which are interwoven in a bewildering manner in the constitution of the members of the group. Several of them have been early introduced into cultivation and given rise to hybrid-strains which are still frequently found in gardens and at times have been highly appreciated. A good figure of *P. atrosanguinea*, as represented by Wallich's specimens, originally so named, may be found in this Magazine on t. 2689. On another plate of the Botanical Magazine (t. 3470), the only authenticated hybrid of *P. nepalensis*, known as *P. Russelliana*, is figured, the other parent being *P. atrosanguinea*. It was produced in W. Russell's nursery at Battersea in 1827 and figured for the first time in Sweet's British Flower Garden (t. 279) in the following year. No natural hybrids between *P. nepalensis* and any member of the *atrosanguinea*-group have been recorded so far, unless we accept Lindley's *P. bicolor* as such. This came from Kashmir and was illustrated in Botanical Register XXXI. t. 62. The figure resembles very much specimens collected around Tragbar in Central Kashmir where *P. nepalensis* and *P. insignis*, a yellow-flowered member of the *atrosanguinea*-group, are known to occur. They may indeed, from their appearance, be crosses between these parents.

P. nepalensis is perfectly hardy and grows well, even in dry soil. In rich soil and shady situations, however, it tends to become lanky and straggly. It is, therefore, more suitable for the rock-garden and sunny situations. It may be readily reproduced from seed or by division or layering.

Our plate was prepared from a plant grown in the rock-garden at Kew, of which it has long been an ornament.

Description.—A *perennial herb*; stems erect or more often ascending from a stout woody rhizome, mostly 25–50 cm. high or, in shady situations or when growing among tall herbage, much drawn up, branched and falsely dichotomous in the upper flowering part, more or less softly and spreadingly hairy. *Basal leaves 5-foliolate*, borne on long (up to 15 cm.) often reddish stalks with hairs like those of the stems; stem leaves 5- to 3-foliolate, on upwards gradually shorter to very short stalks; leaflets sessile or subsessile, *obovate-oblong to oblanceolate or, of the uppermost leaves, linear-lanceolate*, more or less wedge-shaped at the base, blunt or subacute, coarsely dentate, of the basal leaves 2–6·5 cm. by 1–3 cm., of the stem-leaves smaller or at least narrower, all bright green and loosely hairy on the face, *more or less appressedly hairy along the mid-rib and nerves on the back, without a down of curly hairs*; stipules herbaceous, obliquely lanceolate to ovate-acute or acuminate, entire or, of the upper leaves, with one or more teeth, adnate at the base, 1–2·5 cm. long. *Flowers* in ultimately very loose falsely dichotomous panicles; pedicels 7–2 cm. long, slender, hairy like the stems; bracts representing much reduced 3-foliolate or entire leaves. *Sepals* herbaceous, lanceolate, acute or shortly acuminate, the outer rather narrower, more or less coarsely villous, green without, purplish within, closing up over the ripening fruit, 6–9 mm. long. *Petals* obcordate with a wedge-shaped base, 7–14 mm. long, *at first deep rose-red then paling with a dark base*. *Stamens* about 20; filaments purple, up to 4 mm. long; anthers deep purple 1 mm. long. *Torus* subsemiglobose, villous. *Carpels* minute, oblong-ovoid. *Style* slightly thickened at the base, red, 2 mm. long. *Achenes* subellipsoid, obliquely longitudinally ridged, 1–3·5 mm. long.

Distribution.—India. Outer Himalaya from Nepal to Hazara.

O.S.

Fig. 1, a basal leaf and an inflorescence, nat. size; 2, section through a flowering head, × 6; 3, stamen, × 10; 4, pistil with hairs adhering to its base, × 10.

6
1
2
5
5a
4
3

Tab. 9183.

EUONYMUS GRANDIFLORUS, f. salicifolia.

China and India.

Celastraceae. Tribe Celastreae.

Euonymus, Linn.; *Benth. & Hook. f. Gen., Plant.* I. 360; *Loesener in Engl. & Prantl, Nat. Pflanzenf.* III. 5. 199.

Euonymus grandiflorus, *Wall. in Roxb. Fl. Ind. Ed. Carey,* II. 404 (1924); inter species *Euonymi* excellit floribus magnis, petalis carnosulis facie corrugatis, ovulis 8–10 in quoque loculo, caeterum omnino habitu generis.—Wall. Tent. Fl. Nap. 41, t. 30 (1826); et Pl. As. Rar. III. 35, t. 254 (1832); Lawson in Hook. f. Fl. Brit. Ind. I. 608 (1875); Franchet in Bull. Soc. Bot. France, XXXIII. 454 (1886) et Pl. Delav. 130 (1889); Diels in Engl. Bot. Jahrb. XXIX. 439 (1900); Loesener in Engl. Bot. Jahrb. XXX. 452 (1902); Gamble, Man. Ind. Timb. Ed. 2, 171 (1902); Schneider, Ill. Handb. Laubh. II. 175, fig. 112, 114 (1907); Loesener & Rehder in Sargent, Pl. Wilson I. 484 (1913); Osmaston, Forest Fl. Kumaon, 95 (1927).

Syn. *Lophopetalum grandiflorum,* Arnott in Ann. Nat. Hist. III. 151 (1839).

This remarkable and very attractive spindle-tree, probably the finest of its kind, differs in some respects so much from its congeners that Wight and Arnott (1839) joined it with a Malabar plant to form the basis of a new genus *Lophopetalum.* They were no doubt misled by the resemblance of the flowers with their large disc and their curiously corrugated or crested petals and by their ignorance of the fruit of the Malabar species, which is totally different from that of our plant, being a woody capsule with large winged seeds. More recently L. Pierre (1894) for more subtle reasons proposed to segregate *E. grandiflorus* from *Euonymus*, as the representative of a section of a new genus *Pragmotessera.* He mentions as distinctive characters of the genus, which includes among others *E. japonicus*, the tetramery of the flowers, the peculiar placentation of the ovules, apotropous and anatropous from the summit of the loculi, and the absence of vascular bundles in the cork, and, as particularly characteristic of *E. grandiflorus*, the large number of ovules. These features are, however, neither sufficiently distinctive or constantly present in the species referred to *Pragmotessera*, whilst on the other hand *E. grandiflorus* is by its whole facies so clearly of the type of *Euonymus*, as generally understood, that its segregation

would appear to us as unnatural. *E. grandiflorus* ranges over a wide area. Originally discovered by Wallich in the forests of Nepal and by Blinkworth in Kumaon it has since been found to extend throughout the eastern Himalaya, through the Khasia Hills and Upper Burma and far into China (to Shensi according to Loesener). It appears to occur in India in forest between 1,000 and 1,800 m., whilst in China it prefers more open situations, particularly in the neighbourhood of streams, and ranges there (Yunnan) from 1,600 to 3,400 m. It is mostly a tall shrub but Forrest found it occasionally growing into a tree up to 15 m. high. Although very uniform in its flowers and fruits, it exhibits a remarkable diversity in the shape and size of its leaves. The Indian specimens have generally elliptic or obovate-elliptic or obovate-oblong blunt leaves, but lanceolate acute leaves occur occasionally, as in specimens from Bhutan and the Khasias. Osmaston describes them as deciduous in Kumaon, Maire as evergreen in Yunnan*. The obtuse broad type of leaf is also found in China, but narrower, often lanceolate and acute, leaves are more frequent. Both kinds of leaf may be seen in one and the same plant, but as a rule the leaves of a specimen are rather uniform in shape, although they may vary much in size. It would be no doubt possible to sort the specimens by the shape of their leaves, but as this character does not appear to be correlated with any other or to be clearly connected with the factor of distribution, we abstain from proposing definite varieties within our species. The specimen figured here, for the communication of which we are indebted to Sir Charles Cave, Bart., of Sidbury Manor, Sidmouth, represents an extreme type. Other samples since received from him have also distinctly lanceolate leaves, but they are rather broader (8–10 cm. by 1·75–2·5 cm.) and less acuminate or merely acute. The designation "*salicifolia*," which we have added to the specific name, is in the circumstances meant to be rather descriptive than indicative of genetic conditions. A similar *f. salicifolia* was in cultivation at Kew in Sir William Hooker's time, whilst a specimen of the same type was received

* Sir Charles Cave informs us that the shrub behaves with him as an evergreen, while Mr. Besant writes that his plant had, by August, shed all the leaves of the previous year. "Winter-green" is therefore probably the appropriate term for the shrub.

at Kew from Glasnevin in 1922 with the statement that it was raised from the seed of a " tree 25 m. high, in gravel by streams in Bhutan." Among the Chinese field-specimens, Forrest's 14,818 from the Mekong-Salween divide, 13,909 from Wei-Hsi, 22,497 from S.W. Szechuan and Camillo Schneider's 4074 and 4115 also from S.W. Szechuan, tally well with Sir Charles' plant.

E. grandiflorus is quite hardy in the South of England and in Ireland and it fruits in good years abundantly and with great ornamental effect. It is, in the earlier garden-literature, occasionally mentioned as growing in gardens in this country, but the plants grown now seem to owe their existence to a recent introduction by Mr. Cooper from Burma.

Description.—A deciduous perfectly glabrous *shrub* or *tree* up to 15 m. high. Young *branches* divaricate, slender, green and glabrous, older branches with a smooth or slightly rough brown or grey obscurely reticulate bark. *Leaves* winter-green ; *blades* varying from linear-lanceolate (*f. salicifolia*) to obovate or elliptic, rarely suborbicular, from a wedge-shaped to obtuse base, acuminate (*f. salicifolia*), acute or obtuse, 4–11 cm. long, by 2–4 (rarely up to 6) cm. wide, finely serrulate, dark green and somewhat glossy on the face, paler green on the back, midrib prominent, venation delicate ; petioles 0·5–1·3 cm. long. *Flowers* numerous, borne in axillary simple or compound cymes on the young wood, peduncles green, glabrous, somewhat compressed, 3–5 cm. long ; pedicels 0·7–1·8 cm. long, green and glabrous. *Calyx* patelliform with 4 low crescent-shaped lobes, confluent in a ring surrounding the disc. *Petals suborbicular or almost square, fleshy, greenish-white to yellowish, wrinkled on the face,* 6–8 *mm. in diameter. Disc large,* flat, fleshy, green, 6–8 *mm. square. Stamens* rising from pits in the disc ; filaments 2 mm. long, stout ; anthers as shown in fig. 4, 1 mm. long. *Ovary* partially sunk in the disc, conical, 1·5 mm. high, surmounted by a stout style, 1·5 mm. high ; *ovules* 8–10, *imperfectly 2-seriate in each cell. Capsule* greenish-yellow, flushed with deep rose, globose, more or less deeply 4-lobed, commonly somewhat depressed, mostly with the style persistent and apiculate. *Seeds* 6–8 in each capsule, ovoid, black and shining, about 5 mm. long, immerged up to one third in a fleshy wrinkled scarlet aril often as large or

larger than the seed, hanging without the capsule when quite ripe on a long funicle.

DISTRIBUTION.—India. Central and Eastern Himalayas, Khasia Hills and Upper Burma. China: Yunnan and Szechuan.

O. S. & F. B.

Fig. 1, a flowering branch, nat. size; 2, a petal, × 2; 3, a flower without petals in longitudinal section, × 3; 4, a stamen, × 10; 5, fruiting branches, nat. size; 6, a capsule in longitudinal section, nat. size; 7, a seed, without aril, nat. size.

TAB. 9184.

HIPPEASTRUM CANDIDUM.

Argentine.

AMARYLLIDACEAE. Tribe NARCISSEAE.

HIPPEASTRUM Herb.; *Benth. & Hook. f. Gen. Pl.* III. 724; *Pax in Engl. & Prantl, Nat. Pflanzenf.* II. 5. 113.

Hippeastrum candidum, *Stapf* (sp. nov.); affine *H. solandriflora*, Lindl. (Bot. Mag. t. 2573), sed hysteranthium, floribus gracilioribus paulo brevioribus praeter perigonii tubum candidissimis, segmentis lanceolatis angustis ad margines eximie crispis ad medium tantum imbricatis, infimo a lateralibus plerumque late distante; potius indole *H. viridiflori*, Rusby, quae vero floribus viridibus distat.

Until twenty-seven years ago *H. solandriflorum* was the only representative known of the section *Macropodastrum* of *Hippeastrum*, so called on account of the long, slender perigone-tube, in which character it differs widely from the common type of the genus. It is a tropical species of Brasil (north of 15° S. Lat.), the Guyanas, Venezuela and Columbia, which became known more than a hundred years ago through a Mr. Brookes, of Newington, who imported bulbs from Cayenne about 1820. Very soon afterwards it was introduced from Brasil and more recently from Venezuela. A second species, *H. viridiflorum*, of the same section, was collected by H. H. Rusby at the eastern foot of the Bolivian Andes in 1902 and again in 1921, both times within the tropical forest region. To these species we have to add now *H. candidum* as a third and extratropical representative of the section *Macropodastrum*. We owe its introduction to Major A. Pam, of Wormley Bury, Broxbourne, who, in 1925, received bulbs of it under the name *H. tucumanum* from Tucuman, in Argentina. They flowered the next year and furnished the material for our plate. The exact locality where the bulbs were collected is not known, but it is probably within, or not far from, the area whence the true—that is, Holmberg's *H. tucumanum*—came, namely, the "Monte Oriental"-region of the provinces of Salta and Tucuman, a region of an ecological character very different from that of the basins of the Amazonas and Orinoco. I have not seen specimens of this *H. tucumanum*, which, to judge

by Holmberg's very incomplete description, ought to be placed near "*H. ambiguum* var. *Tweedianum*." According to him it has globose bulbs (6 cm. by 7 cm.) with brownish-black tunics and a short neck (3 cm. by 7 cm.), channelled leaves, 38–50 cm. by 2·5 cm. at the base and 4·75 cm. half-way up, a many-flowered scape, 40–50 cm. high, and white flowers of "the size and shape" (tamaño y forma) of those of "*H. ambiguum* (var. *Tweedianum*.)" Holmberg says that when travelling from Jujuy to Salta, on October 28th, 1908, he observed from the train an abundance of white flowers in the "matorras" (scrub) which he thought were the flowers of the white *Hippeastrum* of the occurrence of which he had previously been informed by Señor Miquel Lillo, of Tucuman, and of which he saw a flower in Lillo's Herbarium the next day. This gentleman subsequently sent him some bulbs of what was supposed to be the plant in question. They eventually produced leaves, without, however, flowering. It was on this material and on his recollection of the flower in Lillo's collection, that Holmberg based his description of *H. tucumanum*. Meagre as the description is, the width of the leaves and the size and shape of the flower, as indicated by their resemblance to those of "*H. ambiguum* var. *Tweedianum*," render the identification of our plant with *H. tucumanum* so doubtful that I have preferred to describe it as a new and distinct species. As to *H. ambiguum*, I would remark that this species was originally described (1837) by Herbert in the "Botanical Magazine" (t. 3542) from a plant raised from bulbs which had been received from Lima, possibly from a garden, and from a single flower, collected by Tweedie in Uruguay or South Brasil. He distinguished the former, which is figured in the plate quoted, as var. *longiflorum* and the latter as var. *Tweedianum*. The two plants are so different that they cannot be considered conspecific, and we shall therefore have to speak of the latter as *H. Tweedianum*, a name which appears already on t. 22 of Herbert's *Amaryllidaceae*. Complete specimens of the plant have since been collected by Balansa and by Hassler in Paraguay. They may be distinguished from our plant by their short (3·5–6 cm.) and relatively wide perigone-tube, and the broader (3 cm.) purple-striped apiculate-acuminate segments, which are so imbricate as to form a long and wide funnel.

H. candidum differs from the forms generally classed under *H. solandriflorum* by its more graceful, somewhat shorter flowers, their narrower, exquisitely crisped segments and their colour, which, apart from the greenish tube, is a pure white. In the shape and size of the perigone it closely sembles *H. viridiflorum*, which is, however, described as having green flowers. It also seems to have a relatively longer tube and perigone-segments with rather flat margins.

Señor Lillo, in a phytographical sketch of the flora of Tucuman*, enumerates *H. tucumanum* as occurring on sandy soil in the Monte Oriental, a region of flat land, some distance from the foot of the outer Sierras with a dry atmosphere, scanty rainfall and a moderate temperature with occasional minima of –8° C. (17°·5 F.). If our species should actually come from the same region, it might be expected to be hardy in the milder parts of the British Isles, but so far it has been treated only as a greenhouse plant without special requirements.

Description.—Bulb globose, 7·5 cm. in diameter, with black-purple tunics. *Leaves appearing after flowering*, up to 7, strap-shaped, long tapering downwards, subacute, flatly channelled, *up to over 30 cm. by 2–2·5 cm.* where widest, somewhat glaucous. *Scape* 70 cm. high, 2–5 cm. thick at the base, dark-purple at the base, glaucous upwards. *Umbel* of 6 slightly sweet-scented flowers, supported by 2 lanceolate bracts, which are up to 6 cm. long and soon dry up, turning reddish, pedicels 4 cm. long. *Receptacle* 1–1·2 cm. long. *Perigone* zygomorphous, more or less pendulous, in the mature bud about 20 cm. long; *tube slender, 9–10 cm. long, at the middle 4–5 mm. wide, greenish, loosely funnel-shaped, with the upper halves of the segments separated laterally, the lowermost rather distant from its neighbours*, outer segments *oblanceolate* with recurved tips *and crisped margins, 9–12 cm. by 2 cm., pure white except the base, which is slightly suffused with green, inner segments* very similar, 1·5–1·6 cm. wide. *Stamens* inserted about 7·5 cm. above the base, the outer 7 cm., the inner 8 cm. long; anthers almost 2 cm. long before dehiscing, golden yellow. *Style* 16–18 cm. long; stigma 3-fid, whitish 2 mm. long.

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* Primera Reun. Nac. Soc. Argent. Cienc. Nat. Tucumán, 1916, p. 214 (1918–19).

DISTRIBUTION.—Argentina. Tucuman.

O. S.

Fig. 1, a plant in foliage ; 2 and 3, top of a leaf, in face and back-view ; 4, cross-section through same ; 5, base of the scape ; 6, inflorescence ; 7, a flower ; 8, perigon-tube, cut open, showing insertion of stamens ; 9, stamen. All natural size, except 1, which is one-third of natural size.

L. Snelling del. et lith.

Tab. 9185.

MECONOPSIS BETONICIFOLIA BAILEYI.

Tibet.

Papaveraceæ. Tribe Papavereæ.

Meconopsis, Vig.; *Benth. & Hook. f., Gen. Plant.* I. 52; *Prantl & Kündig in Engl. and Prantl, Nat. Pflanzenf.* III. 2. 141; *Fedde in Engler, Pflanzenreich,* IV. 104. 247.

Meconopsis betonicifolia Baileyi, Cotton in Gard. Chron. Ser. 3, LXXXV. 143 (1929); a *M. betonicifolia Franchetii* Stapf (Syn. *M. betonicifolia,* Franch. Pl. Delav. I. 42, t. 12, 1889) tantummodo ovariis capsulisque setosis atque patria differt.

Syn.: *M. Baileyi,* Prain in Kew Bull. 1915, p. 161; F. Kingdon Ward in Gard Chron. Ser. 3, LXXIX. 340, fig. 171 (1926) et LXXXII. 26 (1927); in Ann. Bot. XL. 541, t. 16, fig. 3 (1926); in Journ. Roy. Hort. Soc. LII. 23, 24, 233, fig. 72 (1927); J. E. Grant White in Gard. Chron. Ser. 3, LXXXI. 449 fig. 217 (1927); Journ. Roy. Hort. Soc. LII., p. xlix (1927); A. Harley in Journ. Roy. Hort. Soc. LIII. 226 (1928).

The name *Meconopsis betonicifolia* was originally given by Franchet to a plant discovered more than forty years ago by Delavay in the mountain woods between Talifu and Likiang in North-western Yunnan. Forrest and Rock have since collected it in the same district (99° 40′–100° 12′ E. by 26° 18′–26° 36′ N.) in various localities in "open rocky alpine meadows by streams." Their and Delavay's specimens are complete and apparently representative of the type. They agree in every respect, except one, with a plant which F. Kingdon Ward collected more recently on and near the Tsang-po, in Tibet, and of which a large number of specimens have since been raised in gardens under the name of *M. Baileyi,* the difference concerning the ovary, which is glabrous in the Yunnan plant and covered with yellowish bristles, which persist up to maturity, in the Tibetan plant. Ward met with the latter, first in 1924, when passing through Lunang, Kongbo (94° 45′ E. by 29° 45′ N.), and again in 1926 (nos. 6836, 6862, 7208) on the Tibet-Burma frontier in the mountains, which form the divide of the Lohit and Saingku rivers, the latter a feeder of the Irawadi. He also took photographs of the plant on the spot, which were printed in the Gardeners' Chronicle and in the Journal of the Royal Horticultural Society. He describes it as a plant of woods and open rocky meadows, 1 to over 2 m. high, often growing near torrents and, in places, extremely abundant. The altitudinal range is given as 3,300–4,000 m. and the time

of flowering as the beginning of June to the end of July. Ward was, however, not the discoverer of the plant, as Major F. M. Bailey had already come across it at Lunang in 1913. Bailey preserved a few flowers on the occasion and these were eventually described by Sir David Prain in the Kew Bulletin (1915) as representing a new species of uncertain affinity, *M. Baileyi.*

The specimen figured in this place was raised from Ward's first seed-sample (no. 5784). It was a pot-grown plant which flowered in 1926 in the Royal Botanic Gardens at Kew. It very closely resembles Bailey's specimen, as far as this goes. Since then this Tibetan plant has been grown in the open at Kew and in various other public and private gardens with the most satisfactory results. Exceedingly fine specimens were obtained, rivalling in strength and in size of the leaves and flowers the best of Ward's field specimens. They exhibit a wide range of fluctuation in general vigour, in height, shape and size of the leaves and of their dentation, which often amounts to lobing, in the number of flowers and their size and, also to a lesser degree, in the depth and shade of their colouring. Ward has already pointed out the close resemblance of his *M. Baileyi* with Franchet's *M. betonicifolia.* Indeed, the two " species " are, as already stated, distinguishable only by the indumentum of the ovary. They thus represent an instance of a group that is very uniform except for one character, which, by its presence in one part of the area and by its absence in the other, divides the group into two morphologically and geographically distinct types. This character is to all appearances constant in the field, and it has also proved constant in cultivation in the Tibetan type, the Yunnan type having not yet been grown. The two types may therefore be conceived as in a relationship of mutation, each dominant in its respective area, or, taxonomically, as " geographical races " of one species. As to which of them is the primitive, we can only speculate. But as the indumentum of the ovary of the Tibetan race is by its nature merely an extension of the hair-covering of the axes and leaves, its absence in the Yunnan plant may be attributed to loss or inhibition of the factor governing it, so that the race with the glabrous ovary, that is the nomenclatorial " type," would appear to be the mutant or mutant variety. For this reason I prefer to speak of the

two types as *M. betonicifolia Franchetii* and *M. betonicifolia Baileyi*, avoiding the misleading formula of a *varietas* or *forma typica.*

The fact that our plant has in so short a time become a prominent feature in English gardens is mainly due to the relative ease with which it can be grown and propagated. Given a rich cool soil and ample moisture during the growing period, it should thrive almost anywhere. Ward, speaking from his observation in the field, calls it a biennial or perennial. Mr. Harley tells us that some of the seedlings raised in 1925 flowered the following year, dying after they had set seed, as did the plant from which our plate was prepared. Others which did not flower, made three or four "crowns," most of which flowered the third year (1927). Of these again some made new side-shoots with the promise of another flowering, so that we might speak of the plant as a perennial, though it may be only of short duration. As it seeds, however, very freely, there should be no danger of losing it.

Description.—A biennial or perennial *herb* of probably short duration, up to over 1 m., or according to Ward, over 2 m. high from a short stout rhizome densely covered with rufous soft bristles and the vestiges of decayed leaves. *Stem* stiffly erect, somewhat stout, sparingly setose to glabrous. *Leaves* basal and scattered along the stem, the basal and the lowest cauline stalked with the stalk up to over 15 cm. long and widened downwards, more or less softly setose: the upper sessile; blades ovate to oblong from a cordate or more rarely narrowed and then decurrent base, mostly sub-acute, coarsely serrate or almost lobed, with depressed teeth, the lowest 18 cm. by 3–8 cm. (in cultivated specimens up to 22 cm. by 2 cm.), with rufous bristles along the margin, face dark green, sparingly setose to glabrous, back pale green to glaucous, glabrous, except for a few stiff bristles on the midrib and main nerves. *Flowers* axillary from the upper leaf-axils and terminal, forming an upwards contracted and often corymboid raceme, nodding; pedicels at length up to 25 cm. long, spreadingly setose upwards. *Sepals* 2, ovate, rufously setose, 2 cm. long. *Petals* 4 (rarely 5 or 6), elliptic to suborbicular, up to 5 cm. long, sky-blue to pale or mauvish-blue. *Stamens* very numerous; filaments whitish, 5–7 mm. long; anthers golden-yellow, up to 1·5 cm. long. *Ovary*

oblong-ovoid, *densely setose, bristles smooth or (seen under the lens) minutely barbed, rufous*; style 3–4 (rarely 6) mm. long; stigma 4–6-lobed, capitate, 3 mm. in diameter. *Capsule* oblong, more or less setose, opening for one-third of its length by 4–6 valves.

DISTRIBUTION.—South-eastern Tibet from the Tsang-po to the Burmese frontier. O.S.

Fig. 1, Young plant, in foliage; 2, 3, whole plant in flower (first flowering); 4, flower in side-view; 5, petal; 6, stamen; 7, semi-mature capsule.—All natural size, except fig. 6, which is × 6.

L. Snelling del. et lith.

Tab. 9186.

RHODODENDRON FORRESTII.

China.

Ericaceae. Tribe Rhododendreae.

Rhododendron, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. i. 35.

Rhododendron Forrestii, *Balf. f. ex Diels in Not. Bot. Gard. Edinb.* V. 211 (1912); arcte affine *R. serpenti* Balf. f. (incl. *R. porphyrophyllo* Balf. f.) quod differt foliis maioribus oblongis plerumque acutis in dorso magis minusve indumento rufo detersili ad costam diutius persistente indutis.—Forrest in Journ. Roy. Hort. Soc. XLII. 46 (1916); Millais, Rhododendrons, Ser. 1, 168 (1917); Ser. 2, 143 (1924); Balf. f., in Not. Bot. Gard. Edinb. XI. 121 (1919).

Syn.: *R. repens,* Balf. f. in Not. Bot. Gard. Edinb. XI. 115 (1919); Farrer in Gard. Chron. Ser, 3, LXIX. 274 (1921); Millais, Rhododendrons, Ser. 2, 221, t. 244 (1924); F. Kingdon Ward in Journ. Roy. Hort. Soc. XLIX. 155 (1924) et Romance of Pl. Hunt. 209 (1924); Cox, Farrer's Last Journey, 177, 233 (1926); McDouall in Journ. Roy. Hort. Soc. LI. 5 (1927); Handel-Mazzetti, Naturbilder S.W. China, 224 (1927).

In the early summer of 1905 Forrest collected on "moist, moss-covered rocks on the ascent of the Tsedjiong pass, Mekong-Salwin divide, Lat. 28° 10′", a rhododendron which he described in his field-label as a "climber of 3—5 ft."* with deep crimson flowers. It was provisionally named *R. Forrestii* by Professor I. Bailey Balfour, and formally, but briefly described by Professor L. Diels in 1912. Forrest subsequently collected what I consider to be the same plant in the same locality and in its neighbourhood within a range of 50—60 km. from north to south, the northernmost station being on Ka gur pu (28° 30′—28° 40′ N.). Dealing with these later collectings of Forrest's, Professor Balfour, in 1919, came to the conclusion that they represented two very closely allied species, which mainly differed in the presence or absence of anthocyanine in the dorsal epidermis of the leaves, the respective species being *R. Forrestii* (backs of leaves purple) and *R. repens* (backs of leaves green). This anthocyanine coloration of the leaf-under surface he supposes to be characteristic of the juvenile state of both "species," but whereas it persists in *R. Forrestii*, having become fixed as an adult character, it disappears in *R. repens*. To me the evidence adduced in favour of this theory appears too slender to separate specifically forms, which, in all other respects,

* The height of the shrub given in his later notes is from 2·5—7·5 cm. to 50—75 cm.

are alike within the limits of ordinary fluctuation. It is true, Professor Balfour also indicates " minor marks of a difference between *R. Forrestii* and *R. repens*," but these break down on closer examination, the indumentum of the ovary being particularly variable as to its composition of gland-tipped and eglandular elongated hairs. In the Journal of the Royal Horticultural Society, XLII. 46, Forrest describes *R. Forrestii* as " a most interesting shrub, with large fleshy flowers of a deep crimson shade. It has the habit of ivy ; attached by roots on the undersurface of its stems, it covers almost perpendicular cliffs and boulders with its bullate glossy foliage. The leaves are very small, broadly ovate and highly coloured ; the blooms pendulous, produced singly in the axils." Farrer is reported to have collected the same plant on the Chawchi Pass on the Yunnan-Burma-frontier in about 27° 20′ N.

In the Latin diagnosis I have compared *R. Forrestii* with *R. serpens*, with which I would identify *R. porphyrophyllum* for the same reasons as I adduced in justification of the union of *R. Forrestii* and *R. repens*. There the casual character of the amount of anthocyanine present in the undersurface of the leaves is even more evident in the material at my disposal. Morphologically, *R. serpens* very closely resembles *R. Forrestii*, the difference being mainly in the shape and size of the leaves and their indumentum on the back, characters which appear to fluctuate sufficiently to make the distinction somewhat difficult in extreme cases. *R. serpens* is, however, said to have pale- to deep-rose-coloured corollas. It is, like *R. Forrestii*, a creeping shrub, rarely much over 15 cm. high, and it also inhabits roughly the same area in the Mekong-Salween divide (28° 12′—28° 40′ N.) with a similar vertical range (3900—4500 m.).

We are indebted for the communication of the specimen, from which our plate was drawn, to the Marquis of Headfort, in whose garden at Kells the plant flowered in March, 1926. Mr. Millais says that it is easy to grow in shade in ordinary garden soil, but rocks with abundant moisture and no hot sun probably offer more congenial conditions. It is undoubtedly one of the most charming dwarf rhododendrons.

Description.—Low creeping *shrub* with gnarled woody stems ; annual increments up to 1 cm. in the wild, up to 2·5 cm.

in the cultivated plant, with the inner oblanceolate to linear membranous bud-scales persistent ; branchlets up to 1·5 mm. diameter, red-brown, glandular with short glands. *Leaves* up to 5, borne in rosettes at the end of the annual growths ; blades broadly oblong-elliptic or sometimes obovate, from an obtuse or cuneate base, *more or less rounded at the apex*, with a minute brownish mucro, *2·5 cm. by 1·7 cm. to 8 mm. by 5 mm.*, rigid, leathery, with a cartilaginous, slightly recurved margin ; face dark green, floccose when quite young with fascicled hairs, soon glabrescent, primary veins in 6—8 pairs, impressed like the midrib and the reticulating veins ; back lighter glaucous-green, often faintly flushed with purple to dark purple, with the midrib, nerves and veins reddish and raised, reticulation distinct, *midrib and veins with shortly stalked red capitate glands and besides often with a fine, early disappearing indumentum ;* petiole up to 12 mm. long, reddish, grooved and minutely floccose above, glandular below. *Flowers terminal*, 1, 2 or 3 on a branch ; bases of pedicels enclosed by bracts during flowering, the outer of these chartaceous, lanceolate, acutely acuminate, green or reddish, up to 1·5 cm. by 5 mm., the inner membranous, ovate to obovate, obtuse, mucronate, up to 2·5 cm. by 1 cm., greenish-yellow or yellow, glabrous save a small well-defined patch of white adpressed hairs at the top within and without ; pedicels up to 2·5 cm. long, with shortly stalked yellow to red coloured glands. *Calyx* saucer-shaped, 3—4 mm. across, divided to near the base into 5 low thin red gland-fringed lobes, glabrous on the back. *Corolla* tubular-campanulate deep crimson, 3—3·8 cm. long, quite glabrous, 5-gibbous ; lobes 5 rounded, 8—9 mm. long and 1·4—2 cm. broad, 2-lobed. *Stamens* 10, up to 2 cm. long ; filaments white, tinged with crimson at the very slightly thickened base, glabrous ; anthers dark brown, about 2 mm. long. *Disc* large, puberulous below the ovary. *Ovary* conical with a rounded blunt apex, grooved, about 4 mm .long, covered with whitish short glands and a few longer pointed hairs, or the proportion of glandular and eglandular hairs more or less reversed. *Style* glabrous, scarcely widened below the lobulate stigma. *Capsule* 2·5 cm. by 0·5 cm., bristly or warted, supported by the persisting calyx. *Seeds* 1·75 mm. by 0·75 mm., pale brown, striate.

Distribution.—China; mountains on the frontier of North-Western Yunnan and Tibet and of Yunnan and North-Eastern Burma.

O.S.

Fig. 1, a flowering shoot; 2, the same in back-view; 3, corolla split open; 4, stamen; 5, gynaecium. Figs. 1—3 nat. size, 4 and 5 × 4.

del. L.Snelling lith.

Tab. 9187.

ACRADENIA FRANKLINIAE.

Tasmania.

Rutaceae. Tribe Boronieae.

Acradenia, Kippist ; *Benth. & Hook. f., Gen. Plant. I.* 292, 990 ; *Engler in Engl. & Prantl, Nat. Pflanzenf.* III. 4. 134, 136.

Acradenia Frankliniae, *Kippist in Proc. Linn. Soc.* II. 201 (1852).—Species unica.

The plant figured here is the only known member of an interesting genus of *Rutaceae* which is confined to a small area in Western Tasmania. It was discovered there in 1842 by Dr. J. Milligan, then Secretary of the Royal Society of Tasmania, when travelling along the Franklin river—a tributary of the Gordon river—in company of Sir John Franklin, the Governor of the island, and Lady Franklin. No flowers were obtainable at the time, and it was not until ten years later that it was described and recognised as the representative of a new genus of *Rutaceae*. Richard Kippist, its author, taking up a suggestion of Dr. Milligan, placed it near *Zieria*, and this is the position usually assigned to it in the great systematic compendia and in Flora Australiensis. It differs from *Zieria* mainly in the pentamerous (not tetramerous) flowers, the number of stamens, namely 10–12 (instead of 4), and the production of the apices of the carpels into ovoid bosses or appendages, each of which contains one large vesicular gland of the lysigenous type, so characteristic of *Rutaceae*. These appendages are green in the fresh state and hardly differentiated from the main body of the carpel, except in so far as they are glabrous and thus stand out from their finely tomentellous basis. In the dry state they turn black and then contrast vividly with the whitish tomentum. In the specimen from which the drawing was prepared, the hair-covering of the ovary was very delicate and therefore omitted by the artist in Figs. 3–5 ; it is, however, well seen in Fig. 7. In the field specimens it is generally very dense and conspicuous. Each of the carpels contains 2 collateral ovules, capped by a caruncle. Of these only one

developes into a seed which, according to F. von Mueller, has only a thin and imperfect layer of endosperm and a straight embryo with ovate, plano-convex thick cotyledons. On account of this seed-structure v. Mueller was inclined to transfer *Acradenia* from the *Boronieae* to the *Xanthophylleae ;* but as I have not had an opportunity of examining seeds of *Acradenia* I am not able to follow up his argument. However, guided by the general appearance of our plant, I would rather place it, with Bentham and Engler, in *Boronieae.*

Acradenia Frankliniae was introduced into cultivation as early as 1845, when Kew received seed of it from Dr. I. O. McWilliam, but it seems to have received little attention from the gardener. It is suitable for the cool-house, where it does well in a mixture of rich loam and leaf-mould. The Marquis of Headfort, to whom we are indebted for the communication of the plant portrayed in the plate, grows it in the open in his garden at Kells, Co. Meath, Ireland, and no doubt many a sheltered place on the west and south-west coast of England or Scotland would suit it equally well. In its home on the banks of the King, Gordon and Pieman rivers, where it is locally common, it forms dense hedges up to over 3 mm. high.

Description.—An erect *shrub* or small *tree*, up to over 3 mm. high ; young branches green, angular, appressedly and often densely minutely puberulous, with pinkish oil-glands, soon glabrescent and often glaucous-pruinose ; old bark dark brown and wrinkled. *Leaves* opposite, 3-foliolate, shortly stalked ; leaflets sessile, lanceolate to lanceolate-oblong from a narrowed entire base, obtuse or rounded at the tip, with revolute, upwards bluntly and shallowly serrulate or crenate margins, 2·5–7 cm. by 0·7–1·8 cm., deep green, with numerous translucent oil-glands, with scattered appressed hairs on the face, particularly along the midrib, quite glabrous and paler green on the back, the oil-glands appearing as small slightly-raised dark spots, midrib prominent, nervation obscure ; petioles 0·5–1 cm. long, stout. *Flowers* in terminal, somewhat crowded shortly stalked corymbose cymes ; axes and bracts very finely downy with reddish oil glands ; *bracts* up to 3 mm. long, subulate ; *pedicels* 0·5–1 cm. long ; bracteoles 2, opposite, about half-way up the pedicel, subulate, about

1 mm. long. *Sepals* 5, free almost to the base, broad-ovate, concave, about 1·5 mm. in diameter, minutely tomentellous, with a few pinkish oil-glands. *Petals* 5, ovate to ovate-elliptic, subacute to obtuse, mostly 5·5 by 3·5 mm., somewhat fleshy, white, minutely tomentellous with very few glands. *Stamens* 10; filaments linear-subulate, 4–5 mm. long, glabrous; anthers 1·5 mm. long. *Disc glands* 10, rather high, alternating with the stamens. *Ovary* pentagonal in cross-section, of 5 carpels, fused in the centre, up to or beyond the middle, produced at the apex into an ovoid or conical blunt appendage containing a large internal gland, the whole ovary minutely whitish tomentellous, except the appendages; style rising from the centre, 2–3 mm. long, ending in a faintly bilobed stigma. *Ovules* 2 in each carpel, collateral. *Fruit* usually only with 1 or 2 perfect carpels, the remainder being abortive, tomentellous; each perfect fruiting carpel more or less square, dehiscing along the adaxial edge and across the top, transversely ridged. *Seed*, only 1 ripening in a carpel, 5 mm. long, smooth.

DISTRIBUTION.—Tasmania; rivers on the west coast.

O. S. & F. B.

Fig. 1, a flowering branch, nat. size; 2, portion of a leaf from below, × 2; 3, a flower, × 3; 4, a flower in longitudinal section, × 3; 5, a flower with petals and stamens removed, × 6; 6, a stamen, × 6; 7, ovary in cross-section, × 12.

W.E.Trevithick del. L.Snelling lith.

Tab. 9188.

RANUNCULUS PSILOSTACHYS.

Balkan Peninsula.

Ranunculaceae. Tribe Ranunculeae.

Ranunculus, Linn.; *Benth. & Hook. f., Gen. Plant.* I. 5 (1862); *Prantl in Engl. & Prantl, Nat. Pflanzenf.* III. 2. 64 (1888).

Ranunculus psilostachys, *Griseb., Spic. Flor. Rumel.* I. 304 (1843); species *R. rumelico,* Griseb. valde affinis, sed radicibus in planta florente elongatis cylindricis, haud brevibus oblongo-ovatis, indumento adpressiuscule sericeo distinguitur.—Boissier, Fl. Or. I. 30 (1867); Janka in Oesterr. Bot. Zeitschr. XX. 111 (1870); Velenovsky, Fl. Bulg. 7 (1891) et Suppl. I. 4 (1898); Halácsy, Consp. Fl. Graec. I. 15 (1900); Turrill in Kew Bulletin 1918, p. 261; Bornmüller in Engl. Bot. Jahrb. LIX. 314 (1925).

Syn.: *R. nissanus,* Petrović, Addit. ad Fl. Agri Nyssani 21 (1885); Lacaita in Kew Bulletin 1918, p. 374; Gard. Chron. LXVII. 101 (1920) et LXXVIII. 246 (1925).

The most disputed botanical points connected with this fine buttercup are concerned with the reduction of *R. nissanus* to *R. psilostachys* and the relationship of this to *R. rumelicus* Griseb. Grisebach described *R. psilostachys* from specimens collected by himself on Mt. Peristeri near Bitolia (Monastir) in North Macedonia and by Friedrichsthal in unnamed mountains in "Rumelia." *R. nissanus* was described by Petrovitch from material collected near Nish in the south-east of Serbia as it was before 1913. Petrovitch's description was entirely in Serbian, but a Latin translation was published by Mr. C. C. Lacaita in the Kew Bulletin 1918, 375. Unfortunately, there are many mistakes in the account given there. The plant figured in our plate is cultivated in gardens as *R. nissanus* (or *R. nyssanus*) and is undoubtedly that species. The chief difference between *R. psilostachys* and *R. nissanus* is supposed to be in the straight beak of the carpels and achenes of the former and the curved beak of those of the latter. This character, however, varies in all degrees from plant to plant and with the age of the flower or fruit. It is noteworthy that Boissier (l.c. 31) separates off Greek plants from the Macedonian as var. *graecus,* with the description "carpellorum rostra subcurvata." *R. nissanus,* as its name indicates, is typically a plant of the southern part of pre-war Serbia, but specimens from this area preserved at Kew are

indistinguishable from typical *R. psilostachys* from more southern districts of the Balkan Peninsula. The size of the flowers and the height of the stems also vary so much that they are evidently fluctuating characters largely dependent on environmental conditions.

If one accepts the above reduction, the critical distinction of *R. psilostachys* from *R. rumelicus* still remains for discussion. On the whole *R. rumelicus* is more southern in its distribution than *R. psilostachys*, but the areas of the two species overlap, as in Greece and South (Greek) Macedonia. The former can probably stand more extreme Mediterranean climatic conditions than the latter and is on the whole, in the wild state, slightly earlier in flowering. The thickened roots of *R. rumelicus* are oblong and shorter than those of *R. psilostachys* in the flowering stage of the plants. The mature leaves are more deeply segmented and the indumentum is more hirsute and less silky. It is, however, important in comparing the two species to use plants at the same stage of development.

In distribution *R. psilostachys* is essentially a Balkan Peninsular plant, as it is known from Greece, Thessaly, Epirus, Albania, North and South Macedonia, the Athos Peninsula, Bulgaria, Serbia, Montenegro and Bosnia. It has, however, been recorded from the Abruzzi (Allg. Bot. Zeitschr. 1910, p. 58) and somewhat doubtfully from Asia Minor. In its native habitats it occurs amongst brushwood on soils derived from both granitic and calcareous rocks. It is easy to cultivate and in gardens flourishes on a variety of soils. It increases rapidly by vegetative means and flowers in June. It is especially suitable for the rock garden or the front of herbaceous borders. The specimen here depicted was grown at Kew in the Rock Garden in a west-facing aspect.

DESCRIPTION.—A tall erect *perennial*, rapidly multiplying by slender stolons at or just below the level of the ground, these rooting and forming a tuft of thickened adventitious roots at their ends and, later, an aerial shoot. *Roots* forming a thick tufted mass arising adventitiously at the base of the stem ; *in the flowering stage* two kinds are present, *elongated, cylindrical, subfleshy* ones and *thread-like* more deeply penetrating ones, though there is no sharp line of distinction between the two kinds. *Stems* erect, usually solitary and

branched in the upper flowering part only ; *covered with adpressed to slightly spreading silky hairs, especially thick in the lower part and very soft and smooth to the touch ;* up to about 4 dm. high, but varying in height very much according to age and habitat-conditions. *Leaves* all radical (apart from those associated with the branch-system of the inflorescence) ; mature radical leaves of rounded outline, deeply 3-partite, the segments wedge-shaped and incised or lobed, *covered with long fine silky hairs on both surfaces* but especially below, up to 1 dm. in diameter but frequently less ; petioles up to 1 dm. long ; on young plants from stolon buds the leaves show every gradation from blades with three very shallow apical lobes to deeply tripartite blades ; cauline leaves (bracts to inflorescence-branches) with 2 to 4 narrow cuneate segments, showing a more or less gradual transition to often simple linear bracts 1 cm. long. *Inflorescence* of 1 to 14 flowers, which stand erect or nearly so when open ; flowers up to 4·5 cm. in diameter, but frequently less. *Calyx* with strongly reflexed sepals which are glabrous within and have long silky hairs on the outside. *Corolla* of glossy, yellow, rounded petals which are suddenly contracted to a short claw and are often about 2 cm. in diameter, but show a considerable range in size. *Stamens* clavate, the anthers passing gradually into the filaments, about 1 cm. long. *Carpels* numerous on an elongated axis, and, in the fruiting condition, forming a cylindrical spike 2 cm. long and 6 mm. in diameter. *Achenes* ovate to orbicular, 3 mm. long, slightly verrucose, with an acute stiff beak which is usually slightly curved.

Distribution.—Balkan Peninsula and recorded from Central Italy and Western Asia Minor.

W. B. Turrill.

Fig. 1, a flowering branch, nat. size ; 2, a radical leaf, nat. size ; 3, root system, nat. size ; 4, a petal, nat. size ; 5, stamen from front, × 6 ; 6, stamen from behind, × 6 ; 7, gynaeceum in young fruit, nat. size ; 8, young achene, × about 8.

L. Snelling del. et lith.

Tab. 9189.

PRIMULA BAILEYANA.

Tibet.

Primulaceae. Tribe Primuleae.

Primula, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 631; *Pax in Engl. & Prantl, Nat. Pflanzenf.* IV. i. 105 et *in Pflanzenreich*, IV. 237. 17.

Primula Baileyana, *F. Kingdon Ward in Not. Bot. Gard. Edinb.* XV. 82, 94 (1926); affinis *P. Gambleanae*, Watt, sed farinosa, foliis basi late cuneatis vel subcordatis (haud sinu clauso cordatis), calyce pro rata longiore (8—9 mm. longo), corolla paulo minore differt.—Gard. Chron. Ser. 3, LXXIX. 200, fig. 100 (1926); F. Kingdon Ward in Journ. Roy. Hort. Soc. LII. 22 et p. xlvi (1927); W. W. Smith & Forrest in Not. Bot. Gard. Edinb. XVI. 38 (1928) et in Journ. Roy. Hort. Soc. LIV. 37 (1929); H. D. McLaren in Journ. Roy. Hort. Soc. LIV. 63 (1929); N. K. Gould, ibid., 74 (1929).

This primula was named by its discoverer, Capt. F. Kingdon Ward, in honour of Major F. M. Bailey, who, in 1913, explored the country at and below the great bend of the Tsangpo which is the home of this delightful plant. According to Ward it occurs abundantly on both sides of the river at altitudes of 3900—4200 m., growing on cliffs and grassy slopes among dwarf rhododendrons and in sheltered gullies. Specimens found by him on Nam La (95° 5′ E. by 29° 37′ N.) at the end of July, 1924, afforded seed which was distributed under No. 5985. Our plant was raised from a portion of this seed that had been presented by Mr. Lionel de Rothschild to Kew in 1925. It flowered first in 1926, but has since been lost. It has proved a difficult grower and is in danger of disappearing from cultivation. At the Royal Horticultural Society's garden at Wisley, so Mr. Gould tells us, there were in 1928 only a few small plants left, and these did not then show any promise of flowering.

The affinity of *P. Baileyana* lies clearly with the members of the section "*Rotundifolia*" of Balfour, a group of species confined to the Central Himalaya and the Tibetan mountain ranges to the north and north-east of it. In general appearance it approaches very closely *P. Littledalei*, a species primarily based on specimens found by St. George R. Littledale in 1896 in the Gooring Valley, about 50 km. N.W. of Lhassa. These were in an advanced state of fruiting, but they are supplemented by a flowering specimen

collected by Capt. H. J. Walton near Lhassa in 1904. Professor W. Wright Smith also refers to *P. Littledalei*, a plant, obtained by Major F. Bailey on Gokar La, about 25 km. to the S.E. of Lhassa, and he further couples with it a specimen secured by Kingdon Ward from the "darkest dampest crevices and nooks of the gneiss cliffs" of Nam La, where it "sometimes is seen in company with No. 5985 (*P. Baileyana*) but much less common than that and at a higher average level." I have not seen Walton's and Bailey's plants, but Littledale's and Kingdon Ward's specimens referred to above give me the impression that they may represent merely more or less robust states of a single type, Littledale's being by far the strongest. Sir G. Watt has credited *P. Littledalei* with possessing yellow flowers, whose petals are contracted into a claw, but there are no flowers with Littledale's collecting and the flowers of Walton's plant appear, according to Professor W. Wright Smith, to "have been purple rather than yellow." Evidently we have to wait for more material to settle the question of the identity of *P. Baileyana* and *P. Littledalei*. Of the other species of the *Rotundifolia*-section *P. Gambleana* has most in common with our plant. It may readily be distinguished by the absence of meal in all parts and by its deeply cordate leaves and relatively large calyces. It is not yet in cultivation.

Description.—A glabrous, *in most parts more or less mealy*, perennial herb, with long fibrous roots. *Leaves* arranged in an open rosette; *blades* orbicular to ovate-orbicular or reniform *with a subtruncate or slightly cordate base*, dentate or crenate, *1—1·25 cm. in diameter*, bright green on the face, more or less *covered with white meal* and prominently nerved on the back; stalks 2—7 cm. long, slender, long persistent and ultimately curled. *Scapes* solitary, up to 18 cm. high, slightly mealy; bracts linear to lanceolate-linear, up to 1·2 cm. long, mealy; pedicels up to over 2 cm. long, erect, mealy. *Calyx more or less tubular, 8—9 mm. long*, divided to or beyond the middle into 5 linear to lanceolate-linear mostly blunt lobes, slightly mealy without, densely so within. *Corolla* violet with a small white eye, slightly mealy; tube 12—15 mm. long, narrow, cylindrical, cupular towards the mouth in the thrum-eyed

form; limb 15—18 mm. across, saucer-shaped, deeply 5-cleft, with broad obcordate lobes. *Stamens* in the thrum-eyed form inserted in the cup-like upper part of the corolla-tube, in the pin-eyed form at the middle of the tube; anthers 1·5—2 mm. long. *Ovary* globose; style in the pin-eyed form slightly longer than the ovary, in the thrum-eyed reaching to the level of the mouth; stigma capitate. *Capsule* ovoid, shorter than the persistent calyx.

Distribution.—South-Eastern Tibet; high mountains along the Tsangpo, south of its bend.

O.S.

Fig. 1, a flowering plant, nat. size; 2, a leaf, nat. size; 3, a bract, × 3; 4, a flower (thrum-eyed), × 2; 5, the same in longitudinal section, × 2; 6, stamens, × 8; 7, a pistil, × 3.

L. Snelling del. et lith.

Tab. 9190.

RHODODENDRON WASONII.

China.

Ericaceae. Tribe Rhododendreae.

Rhododendron, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl., Nat. Pflanzenf.* IV. i. 35.

Rhododendron Wasonii, *Hemsl. & Wilson in Kew Bull.* 1910, p. 105; arcte affine *R. taliensi* Franch. et *R. Przewalskii*, Max. Ab utroque differt ovario indumento floccoso-villoso dense induto, a *R. taliensi* praeterea foliis laxe dispositis. *R. Przewalskii* pedicellis calycibusque glaberrimis gaudet.—Rehder & Wils. in Sargent Pl. Wilson. I. 532 (1913); Millais, Rhododendron, Ser. 1. 260 (1917) et Ser. 2. 259 (1924).

In writing of *Rhododendron haematodes* in a recent article in this Magazine (t. 9165) I referred to the fact that this species differs from *R. neriiflorum*, with which it coincides in its distribution, almost exclusively in the presence of a felted, more or less rust-coloured tomentum on the young shoots and on the underside of the leaves. The present species on one side and *R. taliense* and *R. Przewalskii* on the other are in a similar position. They too differ in the presence and absence respectively of tomentum, but in their case it is the ovary which is primarily concerned, it being densely villous in *R. Wasonii* and perfectly glabrous in the other two species. Of these *R. Przewalskii* also differs markedly from *R. Wasonii* in having perfectly glabrous pedicels and calyces. *R. taliense* on the other hand shows an approach to *R. Wasonii* in the presence of a varying amount of indumentum on the pedicels and calyces, which, however, is never so prominent as in *R. Wasonii*. If the distinctiveness of the last two species is thereby rendered weak, it is on the other hand enhanced by the rather distant arrangement of the leaves and the relative slenderness and scanty hairiness of their stalks in *R. Wasonii*, against their crowding at the tops of the branches and the stoutness of the petioles in *R. taliense*. As to distribution, all the three species contrasted here occur in the highlands around Tachienlu, but this is a case of overlapping areas rather than one of coincident distribution, as *R. taliense* ranges southwards as far as the mountains of Tali in Yunnan, and *R. Przewalskii** northwards to Kansu.

*I am inclined to identify *R. Przewalskii* with J. B. Balfour and W. W. Smith's *R. phaeotrichum* from the mountains in the north-east of the Yangtse bend (27° 30′—27° 45′ N.) which, if correct, indicates a considerable extension of the area of *R. Przewalskii* to the south.

Like *R. taliense*, *R. Wasonii* exhibits, in the field as well as in the garden, a remarkable range of colour variation in the corolla, namely, from white through creamy-white to pale yellow or through flushes of pink to a pure pink of varying shade. The plant depicted in this place represents a fine combination of lemon-yellow and pink. We are indebted for its communication to the Marquis of Headfort, who informs us that it is one of the original stock of Veitch's introduction from Wilson's collecting of 1904. Wilson discovered the species in the forests of Tachienlu and proposed the name *R. Wasonii* for it in compliment to Mr. Cathcart Wason, R.N., in 1903–04 Lieut.-Commander of H.M.S. "Woodlark" at Chungking, on the upper Yangtse river, as a mark of approbation of his kind offices. It remains to add that the species is quite hardy also in England and has repeatedly flowered here in the south and west.

Description.—A *shrub* from less than 1 to over 2 m. high; young branches stout, hoary, early becoming glabrescent; older branches with a smooth grey or brownish bark. *Leaves rather scattered, in subopposite pairs or in false whorls of* 3; blades ovate-lanceolate to ovate or ovate-elliptic, from an obtuse or broadly rounded base, acute and mostly cuspidate, 5—7·5 cm. by 2·3—4 cm., coriaceous, dark green on the face, more or less densely covered with a rusty-brown felt on the back; midrib impressed above, lateral nerves slightly so, the former prominent below; petiole stout, channelled above, 5—10 mm. long, more or less shortly felted when young, often quite glabrescent. *Flowers* 6—7 in short corymbose racemes; rhachis 5—7 mm. long, more or less villous or glabrous. *Bracts* oblong acute, 1·6—1·8 cm. by 0·3—0·8 cm., villous without, pubescent within; bracteoles filiform, 5—6 mm. long, silkily pubescent. *Pedicels* suberect, 1·5—2·5 cm. long, floccose-villous. *Calyx* very small, oblique, annular, divided into acute triangular teeth, about 1 mm. long, floccose without. *Corolla* widely campanulate, 5-lobed, 3—3·5 cm. long, 3—3·5 cm. across the mouth, glabrous without, minutely pubescent at the base within, white, creamy or lemon-yellow with a posticous flush of rose or altogether rose, flecked with crimson spots; lobes very slightly spreading, overlapping, suborbicular, sometimes faintly emarginate,

up to 1·5 cm. diameter. *Stamens* 10, included, unequal; filaments slender, broadening somewhat at the base, very shortly hairy to villous in the lower half, 1—1·7 cm. long; anthers 2·5 mm. long. *Ovary* subcylindrical, rounded above, shallowly furrowed, greenish, *densely villous*, 4—5 mm. long; style long exserted, up to 3 cm. long, glabrous; stigma capitate, lobed. *Capsule* up to 1·9 cm. long and 4 mm. broad, *brown-felted*, the felt often rubbing off in part.

Distribution.—China; high mountains of Western Szechuan, 2600—3600 m.

O.S.

Fig. 1, a flowering branch; 2, hairs on lower surface of leaf; 3, a bract; 4, a flower in face view; 5, a corolla opened out from within; 6, a stamen; 7, a flower with corolla, stamens and style removed; 8, style.—Figs. 1, 3, 4, 5, nat. size; 2, × 35; 6, 7, 8, × 4.

W.E.Trevithick et L.Snelling del. L.Snelling lith

TAB. 9191.

SARCOPODIUM LYONII.

Philippine Islands.

ORCHIDACEAE. Tribe KEROSPHAEREAE.

SARCOPODIUM Lindl.; *Kränzl. in Engl. Pflanzenreich*, Orch–Dendr I. 319.—Dendrobium *sect.* Sarcopodium *Benth. & Hook. f., Gen. Plant.* III. 499; *Pfitz. in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 175.

Sarcopodium Lyonii, *Rolfe in Orch. Rev.* XVIII. 240 (1910); affine *S. acuminato* Kränzl., sed foliis longioribus, floribus maioribus roseo-vinaceis, labello versus basin callis duobus parvis instructo, lobis lateralibus intermedium basi non imbricantibus facile distinguendum.—Ames in Philipp. Journ. Sc. VI. Bot. 53 (1911) et in Addisonia, VIII. 17, t. 265 (1923); Rolfe in Orch. Rev. XXV. 159 (1917) et XXXI. 323, cum tab. (1923).

Syn.: *Dendrobium acuminatum* Lyon in Gard. Chron. Ser. III. XLII. 210, fig. 88 (1907) & XLIII. 194 (1908); Kränzlin in Orchis, I. t. 16; II. 73 (1908); Journ. Hort. LIX. 291, cum tab. (1909); Gard. Chron. Ser. III. XLVI. 150, fig. 64 (1909); Gard. Mag. LII. 660, cum tab. (1909); Journ. Roy. Hort. Soc. XXXV. p. clxxii (1910) et XLIII. p. lxiii (1919); Orch. World, I. 221, cum tab. (1911); Oesterr. Gart. Zeit. VIII. 136, fig. 53 (1913), excl. syn. et loc. "Ind. Bor."; Orchis, IX. 20, Abb. 5 (1915); Schlechter, Die Orchideen, 250 (1915); non Rolfe ex Ames nec H.B.K.

Dendrobium Lyonii Ames, Orchid. II. 177 (1908) et V. 110, 127 (1915); et in Philipp. Journ. Sc. IV. Bot. 672 (1909); et in Merrill, Enum. Philipp. Flow. Pl. I. 351 (1925).

Sarcopodium acuminatum var. *Lyonii*, Kränzlin in Fedde, Repert. VII. 41 (1909), et in Engl. Pflanzenreich, Orch.–Dendr. I. 329, fig. 32, A–C (1910).

As is indicated by the above synonymy, *Sarcopodium Lyonii* has had a chequered taxonomic career, and even now the name does not find universal acceptance among Orchidologists. In the writer's opinion the genus *Sarcopodium* is well marked-off from *Dendrobium* by its habit and also by the general character of the flowers.

S. Lyonii is one of the most beautiful, perhaps the most beautiful, of the species of the genus and has often secured awards in exhibitions, etc. Curiously enough, it has been on almost all occasions exhibited as *Dendrobium acuminatum* Rolfe (*S. acuminatum Kränzl.*), although some of the differences between the two species were pointed out at an early date. The whole trouble seems to have been due to the non-appearance of true *S. acuminatum* in cultivation, although, according to Lyon, it is the easier of the two to grow at sea-

level. The two species can be distinguished from one another by a number of characters. Lyon, in a letter to Oakes Ames, draws attention to the presence of a small hard tooth at the apex of the pseudobulb in *S. Lyonii* (easily observable in the Kew specimens), a feature absent from *S. acuminatum*, and also mentions that the old scapes remain on the pseudobulbs for several years in the former species while they fall the same year in the latter. The leaves in *S. Lyonii* are longer than in its ally, while the flowers are considerably larger, and instead of being white with a yellow disc to the lip are a beautiful pink with claret-coloured centre. In addition to this the side lobes of the lip overlap the base of the middle lobe in *S. acuminatum*, whereas this is not the case in *S. Lyonii*. Lyon states that the flowers of the latter species are delightfully fragrant, especially in the morning and in bright sunshine, while those of its congener are scentless.

S. Lyonii is found only in the island of Luzon and is there restricted to a narrow altitudinal belt between 600 and 1,100 m. above sea level. *S. acuminatum*, on the other hand, is found between 1,050 and 1,950 m. altitude.

At Kew *S. Lyonii* is grown in a warm house in which the temperature is maintained at 75–80° during the summer and 70–75° in winter, while the pseudobulbs are ripened well in the autumn. Water is supplied plentifully in the growing season, but sparingly during the resting period. The plants are, however, never dried off as in the deciduous species of *Dendrobium*.

The specimen from which our plate was prepared was obtained from the late Mr. Pitt, of Stamford Hill, in June, 1926.

Description.—An epiphyte. *Pseudobulbs* closely placed on a short creeping rhizome, conical or ovoid-conical with four rounded angles, 3–5 cm. long, somewhat flattened, appearing quite smooth, but actually very finely pitted, shining, with several brown sheaths at the base, two-leaved. *Leaves* oblong, narrowed at the base into a short false petiole, *10–20 cm. long, 3–4·5 cm. wide*, with a shortly and unequally bilobed apex, coriaceous, deep green. *Inflorescence* usually pendulous or drooping, up to 50 cm. long, and bearing up to 18 flowers; floral bracts narrowly oblong, acute, sheathing, 15–25 mm. long, membranous, pale chestnut brown. *Flowers* spreading;

pedicels rather stout, 2–3 cm. long. *Sepals* narrowly lanceolate, acute or acuminate, dorsal *3·5–4 cm. long, 7–9 mm. wide*, lateral somewhat falcate or oblique, 3·5–4 cm. long, forming at the base a mentum about 1 cm. long. *Petals* similar to the dorsal sepal and, as is the case with the sepals, the edges showing a tendency to become revolute; both *sepals and petals a pale pink deepening towards the base*, the nerves slightly darker, but not usually so pronounced as in the accompanying plate. *Lip* three-lobed, curved, 3 cm. long; *lateral lobes* obtuse or subacute, *upright and partially enfolding the column*, about 8–10 mm. long, *deep wine-coloured*; middle lobe ovate-rhomboid, with a short narrower claw, acuminate, 1·7–1·8 cm. long, 1·1–1·3 wide just below the middle, *very pale pink or almost white at the apex and gradually shading into a deep wine-colour at the base; disc with three short and low keels*, the middle one longer than the others. *Column* about 1 cm. long, slightly arched forwards, concave below, with a long curved foot. *Anther* vertical, cap with a low central ridge, otherwise flattened, column and anther-cap wine-coloured.

Distribution.—Philippine Islands; Luzon, province of Bataan, 600–1,100 m.

V. S. Summerhayes.

Fig. 1, pseudobulb and leaves, nat. size; 2, portion of an inflorescence, nat. size; 3, lip, spread out, nat. size; 4, upper part of column to show anther, × 3·5; 5, 6, anther, seen from above and in section respectively, × 5; 7, a pair of pollinia, × 5.

L. Snelling et W.E. Trevithick del. L. Snelling lith.

Tab. 9192.

PRUNUS PILOSIUSCULA.

China.

Rosaceæ. Tribe Pruneæ.

Prunus, Linn.; *Benth. & Hook. f., Gen. Plant.* I. 609; *Focke in Engl. & Prantl, Nat. Pflanzenf.* III. 3. 51.

Prunus (Cerasus) pilosiuscula, *Koehne in Wiss. Beil. Jahresber. Falk-Realgymnas. Berlin,* 1912, p. 11 et *in Sargent, Pl. Wilson.* I. 202, 230, 239 (excl. var. *barbata*) (1912); arcte affinis *P. litigiosae,* C. K. Schneider, sed foliis adultis potius ex elliptico ad obovatum vel oblongum vergentibus atque paulo maioribus utrinque pilis rigidiusculis brevibus scaberulis, novellis in dorso interdum tomentosis, racemorum pedunculis tandem ad 2–2·5 cm. longis, pedicellis et receptaculis sæpius pilosis.—C. K. Schneider, Ill. Handb. Laubholzk. II. 987 (excl. var. *barbata*) (1912); Bull. Arnold Arb. New Ser. V. 10 (1919); Rehder in Journ. Arnold Arb. V. 222 (1924).

Syn.: *P. pilosiuscula* var. *media,* Koehne in Sargent, Pl. Wilson. I. 204 (1913) pro parte; Journ. Roy. Hort. Soc. XLVII. p. xl. (1922); Thatcher in Gard. Chron. Ser. 3, LXXII. 166 (1922); Bull. Arnold Arb. New Ser. IX. 8 (1923).

P. tatsienensis var. *pilosiuscula,* C. K. Schneider in Fedde, Repert. I. 66 (1912).

P. polytricha, Koehne in Wiss. Beil. Jahresber. Falk-Realgymnas. Berlin, 1912, p. 11 et in Sargent, Pl. Wilson. I. 204, 230, 239 (1912); C. K. Schneider, Ill. Handb. Laubholzk. II. 988 (1912).

P. venusta, Koehne, ll. cc. 1912, p. 11 et I. 230, 239 (1912); C. K. Schneider, l. c.

(?) *P. pulchella,* Koehne in Sargent, Pl. Wilson. I. 197, 229, 238 (1912); C. K. Schneider, l. c. II. 989 (1912).

In 1912 Dr. E. Koehne published in the Jahresbericht of the Falk-Realgymnasium at Berlin a paper on the Cherries (*Prunus* subg. *Cerasus*), in which he attempted a new classification of this difficult group. In the same year an elaborate account of the Chinese species of *Prunus* together with a key to and a synopsis of all the species of the subgenus *Cerasus* by the same author appeared in Plantae Wilsonianae, and a paraphrase of it by C. K. Schneider in the supplement to his Handbuch d. Laubholzkunde. Koehne's classification still holds the field. As far as its main features are concerned, it may be admitted as natural, but when we survey the ultimate results of his analysis, we cannot help thinking that the latter was carried too far. This applies particularly to the group to which the plant figured in this place belongs. This group, as I conceive it, corresponds to Koehne's subsections *Phyllomahaleb* and *Phyllocerasus,* subsections so closely connected that the advantage of giving them distinctive names is not evident. It stands out from the remainder of the cherries by the correlation of these characters—racemose bracteate inflorescences, loose or contracted into few-flowered corymbs or reduced to a pseudoterminal pair of flowers or a solitary flower; bracts conspicuous, foliaceous, more or less rounded, gland-fringed, persistent; receptacles campanulate; sepals reflexed; petals entire; leaf-blades glandular-serrate, of medium size. This group, which may conveniently retain the subsectional name *Phyllocerasus,* is confined to western China from northern Yunnan to southern Kansu and to an outlying area, covering the basin of the lower Amur, Mandshuria, Korea and Japan, the latter as far north as Sachalin. Koehne refers to it 19 species and varieties, to which 3 more, placed elsewhere, have to be added. Two of these species were described more than 30 years ago by Batalin, one (*P. tatsienensis*) in the early flowering stage with young leaves, the other (*P. szechuanica*) in fruit. The next to become known (1905) were C. K. Schneider's *P. litigiosa,* based on a flowering specimen with young leaves, and the same author's *P. clarifolia* diagnosed from a fruiting specimen. The remainder are additions proposed by Koehne. Some of these are also known only from incomplete material. In the circumstances it is obviously difficult to form an adequate idea of the nature and amplitude of fluctuation within the proposed species. This much, however, emerges from a close examination of the specimens available in the Kew Herbaria —whether they be individual samples or companions of one collecting or originate from the same district—that there is a considerable range of fluctuation in the size and shape of the leaves, in the hairiness of all organs and in the rate and degree of the disappearance of the hairs, in the length of the floral axes and their final elongation,

in the size and shape of the bracts and their glands, and to a lesser degree in the shape and size of the drupes and the sculpturing of their stones. Taking this into consideration, the discrimination of genetically fixed types, whether we call them species or varieties, cannot be but difficult and often precarious. However, guided by the general experience gained, I have attempted to revise the classification of the *Phyllocerasus*-group, and I would render the result of the revision as follows :—

A—Key to the More Completely Known Species.

Racemes normally elongated (at least towards the end of flowering) and up to 9-flowered, with rather large bracts, up to and even over 1 cm. long ; stones variously grooved and pitted.
- Glabrous or nearly glabrous ; bracts conspicuously gland-fringed.
  - Leaf-blades caudate, acumen 1–2 cm. long.
    - Leaf-blades broadly elliptic, 4–6·5 cm. by 2–4 cm. ; bracts up to 1 cm. long, the lowest sometimes stalked . . . . . *conadenia* Koehne.
    - Leaf-blades oblong, 5–9 cm. by 2–3 cm. ; bracts up to 0·5 cm. long or only the lowest somewhat longer . . *pleiocerasus* Koehne.
  - Leaf-blades acuminate, acumen 0·5–1 cm. long, broad-elliptic, 3–10 cm. by 2–2·5 cm. ; bracts up to 1·5 cm. long, round or ovate and then acute to acutely acuminate *discadenia* Koehne.
- Hairy in most parts, at least when young ; bracts with very inconspicuous glands ; leaf-blades elliptic to ovate or obovate, 5–7·5 cm. by 2·5–4·5 cm., more or less acuminate, somewhat coarsely serrate, nerves rather straight . . *Maximowiczii* Rupr.

Racemes normally contracted into up to 4-flowered subsessile shortly peduncled corymbs, or reduced to paired or solitary flowers ; bracts small to middle-sized, finely serrate with minute glands ; stones smooth.
- Leaf-blades often coarsely serrate, 5·5–5·8 cm. by 2·75 to 4·5 cm., more or less rough from small stiff hairs on both sides, sometimes tomentose on the back when young ; peduncles ultimately frequently 2 and even 2·5 cm. long ; pedicels and receptacles varying from glabrous to densely hairy . . . . . *pilosiuscula* Koehne.
- Leaf-blades finely serrate, 4–6 (rarely to 8) cm. by 2–2·75 (rarely 4) like the growing branches glabrous or scantily hairy, early glabrescent and smooth ; peduncles very short, rarely over 5 mm. long ; pedicels and receptacles glabrous or the former very sparingly hairy . . . *litigiosa* Schneider.

B—Synonymy and Distribution.

A—Keyed Species.

1. *P. conadenia.* Syn. *P. tatsienensis* var. *adenophora* Koehne. Western Szechuan to Northern Yunnan (Wilson, A. A. Exp. 904, 2823 ; Delavay's *P. tatsienensis* v. *adenophora* ; Forrest, 2073, 9995, 10011, 13759, 13778, 16417, 19432, 19599 21610, 25456).
2. *P. pleiocerasus.* Syn. *P. tatsienensis* var. *stenadenia* Koehne. Western Szechuan (Wilson A. A. Exp. 904, 4013).
3. *P. discadenia.* Hupeh (Farges ; Wilson, Veitch Exp. 2075 ; A. A. Exp. 174, 2829, 2832).
4. *P. Maximowiczii.* Mandshuria, Korea, Sachalin, Japan (numerous specimens).
5. *P. pilosiuscula.* See this article.
6. *P. litigiosa.* Syn. *P. litigiosa* v. *abbreviata,* Koehne ; *P. variabilis* Koehne ; *P. Rehderiana* Koehne. Hupeh (Henry 5295, 6308, 6324 ; Farges ; Wilson, Veitch Exp. 1868; A. A. Exp. 18, 39, 64, 182, 2828, 2830, 2831; Cult. e Wilson, 16, 18a,39/a).

C—Incompletely Known Species.

7. *P. szechuanica,* Bat. Not seen. Resembling *P. conadenia* in the inflorescence, but stone smooth. Western Szechuan (near Tachienlu, Kashkarov).
8. *P. clarifolia,* C. K. Schneider. Not seen. Evidently very near to *P. litigiosa,* but the leaves shortly acuminate, broadly and more or less doubly-serrate, and the stones sometimes slightly reticulate. Szechuan (Bock & Rosthorn, 2240).

9. *P. tatsienensis,* Bat. Known from young flowering specimens only. Syn. *P. Zappeyana ? subsimplex.* Western China (Potanin ; Wilson Veitch Exp. 3526). Possibly a young state of *P. conadenia.*
10. *P. podadenia* Koehne. Known only from fruiting specimens. As to inflorescences rather near *P. litigiosa,* but leaves softly hairy on both sides with markedly doubly serrate margins and stone with raised veins, and on the whole rather nearer the first group. Western China (Wilson, Veitch Exp. 3525a).
11. *P. macradenia* Koehne, known from meagre fruiting specimens only. Probably the fruiting stage of *P. droseracea,* Koehne, which is known only in the flowering condition. Both differ from *P. podadenia* in the finer and mostly simple serrature of the leaves and (*P. macradenia*) in the smaller fruits (stones 6 mm. against 8 mm. in *P. podadenia*). Western Szechuan (Wilson, A. A. Exp. 2821 in fruit, 4016 in flower).

Brief as this summary is, it demonstrates clearly the incompleteness of our knowledge of the group under consideration and the precarious and provisional character of any conclusion we may base on it. It will therefore, not surprise the reader if I confess to some diffidence in the assignation of specific rank to the form figured here, although I have no doubt as to its identity with what must be considered as the basis of Koehne's *P. pilosiuscula.* The affinity of our plant with *P. litigiosa* is very close indeed. It would require no great stretch of imagination to construe a transition-series from typical *P. litigiosa* through typical *P. pilosiuscula* to the extreme hairy form of the latter, which was described by Koehne as *P. polytricha.* But if we take a bird's-eye view of the series, its constituent elements appear to group themselves towards two distinct foci. It is these which I wish to emphasize when speaking of two species in this *litigiosa-pilosiuscula* series.

I have indicated their differential characters in the usual way and need not repeat them here, but I would remark that they seem to come true in cultivation and may therefore claim genetic value. Of these characters the roughness of the underside of the adult leaf-blades in *P. pilosiuscula* is perhaps the most reliable guide for the recognition of the species. It is due to the presence of minute rigid hairs on the midrib nerves and veins.

P. pilosiuscula was proposed by Koehne to cover the *P. tatsienensis* var. *pilosiuscula* of C. K. Schneider and other forms which he described as var. *barbata,* var. *media* and var. *subvestita.* Of these I would refer the first to *P. litigiosa,* whilst the last is a rather hairy state of *P. pilosiuscula.* The original of Schneider's variety is a fruiting specimen collected in 1888 by Dr. A. Henry (no. 5604) in Wushan, on the Hupeh-Szechuan boundary. He described it as a "common large forest tree, 30–40 ft. high." Henry's 5721 from the same locality and 6091 from Patung also belong here. These two were collected too late for flowers, but they are well supplemented by Wilson's nos. 316 (Veitch Exp.) and 41 (A. A. Exp.) also from Patung. All these specimens agree in their coarsely serrate leaves, rough on the back whilst the pedicels are either glabrous or sparingly hairy. Koehne refers Henry's no. 5604 to his var. *media* and Wilson's no 41 to his var. *subvestita* of *P. pilosiuscula.* He also quotes Wilson's 16a and 39a under var. *media.* These I have not seen, but plants grown from Wilson 16 and 39a are typical *P. litigiosa.* A more hairy state is represented by Wilson, no. 47, again from Patung. It is a fruiting specimen with leaves resembling in outline those of Wilson no. 41 and in their finer serrature those of Henry nos. 5721 and 6091, but differing in their being densely tomentose on both sides when unfolding. Their hairs also disappear much more tardily from the spaces between the nerves and may in part persist even in the adult leaves for a considerable time. This increase in hairiness extends to the pedicels and more or less also to the receptacles, the hairs persisting up to fruiting. Plants raised from Wilson no. 41 resemble the field specimens in hairiness to a varying degree, the unfolding leaves being sometimes densely tomentose and sometimes only loosely and shortly hairy between the nerves, whilst the pedicels and receptacles vary from loosely hairy to glabrous. As to shape and size, the adult leaves of this cultivated plant fluctuate, but they are generally more oblong in the long-shoots formed in the summer than in the earlier flowering branches. Their serrature too fluctuates considerably, namely, from coarsely to rather finely serrate. Wilson's no. 47 served Koehne for the description of his *P. polytricha,* but it is evident from what has been said that it cannot be separated from the *pilosiuscula*-type except as a more extreme phase in the fluctuation-curve of hairiness. I have also quoted above as synonyms of *P. pilosiuscula* Koehne's *P. venusta* and *P. pulchella,* the latter with a sign of interrogation. *P. venusta* is, like *P. polytricha,* based on a Patung specimen of Wilson's with flowers and young leaves which have just become unfolded. The latter tally completely with leaves of the same stage of *P. polytricha,*

and so do the pedicels and receptacles respectively. I may add that the same condition is represented by a specimen collected by Abbé E. Licent (no. 5183) at Pei la ha in southeastern Kansu. *P. pulchella* also rests on a single collecting. It is Wilson's no. 2827 (A. A. Exp.) from Hsing shan Hsien, a township north of Patung. It is in the late flowering state. The leaves are small and of the shape prevalent in *P. litigiosa*, but their indumentum and that of their pedicels are as in the more hairy state of *P. pilosiuscula*.

The specimens, from which the flowering branch of our plate was drawn, were kindly supplied by Mr. F. R. S. Balfour, who grew the plant in his garden at Dawyck, Stobo, Scotland, as *P. pilosiuscula* var. *barbata*. They vary somewhat in the amount of the tomentum of the unfolding leaves, some being densely whitish tomentose, whilst others have only few hairs between the nerves. The adult leaves, however, retain in either case enough of the indumentum to render them rough to the touch. The hairiness of their pedicels and receptacles is generally less pronounced and may even be absent, even when the accompanying young leaves are whitish tomentose on the back. The figure of the fruiting branch was prepared from a plant grown at Kew as *P. pilosiuscula* var. *barbata* (Wilson 18), which agrees perfectly with the more glabrous samples received from Mr. Balfour. *P. pilosiuscula* is quite hardy in this country. It flowers profusely early in April and matures its fruit in June. Specimens exhibited by the Hon. Vicary Gibbs of Aldenham, Hertfordshire, under the name *P. pilosiuscula v. media* received an Award of Merit when shown before the Royal Horticultural Society on April 5, 1921. His plant was then a free growing tree about 5 m. high.

Description.—A tall *shrub* or *tree*, up to 13 m. high, with a trunk 20–40 cm. in diameter; young branches more or less appressedly hairy and purplish, last year's brownish grey, smooth. *Buds* ovoid, up to 7 mm. long, before bursting; perules rounded, thinly coriaceous, glabrous, often persistent for some time after the bursting of the bud. *Leaf-blades elliptic to obovate or oblong*, from a rounded, rarely slightly cordate or acute base, suddenly contracted into a slender acumen (1–2 cm. long) *somewhat coarsely serrate or dentate-serrate with the teeth simple* or in large leaves frequently 1–3-denticulate and ending in minute mucro-like hydatodes, *when adult 4·5–7 (rarely 8·5) cm. by 2·75–4·5 cm.*, papery, *adpressedly and minutely hairy on the face with the hairs rather short and stiff, often more or less densely tomentose on the back when unfolding, then more or less glabrescent on both sides except the midrib and main-nerves, when adult somewhat rough to the touch owing to the persistent hairs and hair-bases*; lateral nerves 7–9 on each side, straight in the lower half or very slightly curved from near the base; leaf-stalk 8–12 mm. long, slender, at first more or less hairy, then glabrescent; nectarial glands 2 or 3, close to the blade or on its base, rarely none; stipules linear-subulate to linear-lanceolate, glandular-fimbriate, up to 7 mm. long, early deciduous or on long shoots, foliaceous, obliquely ovate, glandular-serrate, up to over 12 cm. long, persistent. *Flowers* solitary or in sessile or peduncled pairs or contracted 3 or 4-flowered racemes; *peduncles from a few millimetres to 2–2·5 cm.* long, more or less hairy, bracts orbicular to ovate-orbicular, rarely the lowermost barren ovate, acute, and stalked, minutely glandular-serrate, 5–7 (very rarely 10) mm, long, minutely pubescent, long, persistent; *pedicels* pendulous, 2–3 cm. long, *very sparingly to densely pubescent. Receptacle* campanulate, 4–5 mm. long, purplish, *glabrous, or more or less pubescent all over or only at the base. Sepals* oblong-triangular, subacute, 2·5–3 mm. long, glabrous, rarely loosely hairy, entire or obscurely and minutely glandular-dentate. *Petals* rotundate to obovate, obtuse, white, flushed with pink, up to 10 mm. by 4–8 mm. *Stamens* about 25, long exserted, filaments up to 1 cm. long. *Ovary* ovoid, glabrous; style 8–12 mm. long, sparingly hairy to loosely villous in its lower half; stigma minutely discoid. *Drupe* when dry, oblong and subacute, when fresh, subglobose and about 1 cm. long, red, flesh thin; stone oblong, 6 mm. by 4·5 mm. quite smooth with a short depression on each side of the base of the anticous flat ridge.

Distribution.—China; Hupeh and adjoining parts of Szechuan, also Southern Kansu.

O.S.

Fig. 1, flowering branch, nat. size; 2, top of young summer-shoot, nat. size; 3, base of young leaf, face-view, × 4; 4, receptacle and calyx, × 6; 5, the same (cut open) with pistil, × 6; 6, petal, × 3; 7, anthers with tops of filaments, × 8; 8, fruiting branch, nat. size; 9, stone, nat. size; 10, the same, × 4.

W.E.Trevithick et L.Snelling del. L.Snelling lith.

Tab. 9193.

TSUGA CHINENSIS.

China.

Pinaceæ. Tribe Abieteæ.

Tsuga, Carr.; *Benth. & Hook, f., Gen. Plant.* III. 440; *Eichler in Engler & Prantl, Nat. Pflanzenf.* II. 1. 80.

Tsuga chinensis, *E. Pritzel in Engl. Bot. Jahrb.* XXIX. 217 (1900); *T. yunnanensi*, Mast. (quoad syn. *Abietis yunnanensis* Franch.) et *T. dumosæ* Eichl. affinis. Ab utraque differt conis magis minusve pedunculatis maioribus subglobosis, squamis rotundatis sæpe paulo latioribus quam altis firmioribus nitidis, præterea a priore foliis sæpissime apice emarginatis et subconcoloribus, a posteriore foliis apicem versus haud attenuatis et ad margines lævibus diversa.—Masters in Journ. Linn. Soc. Bot. XXVI.556 (1902) et XXXVII. 421 (1906); Elwes & Henry, Trees Great Brit. and Ireland, II. 229 (1907); Beissner, Handb. Nadelholzk. Ed. 2, p. 82 (1909); Paschke in Engl. Bot. Jahrb. XLVIII. 639, 641 (1913); Wilson, Second Arnold Arb. Exped. China, t. 085 (1912) et Naturalist in W. China, I. 44; II. 20 (1913); Rehder & Wils. in Sargent, Pl. Wilson. II. 37, 621 (1914); Bean, Trees and Shrubs, Hardy in Brit. Isl. Ed. 3, II. 606 (1921); Dallimore & Jacks., Handb. Conif. 533, fig. 117 a-d (1923); Downie in Not. Bot. Gard. Edinb. XIV. 14, 16, 18, t. 194, fig. 5 (1923).

Syn.: *Abies thié-sha*, David, Journ. Trois. Voy. I. 343 (1875); Bretschneider, Eur. Bot. Disc. China, 848, 852 (1898).

A. Tsuga, Franch. in Nouv. Arch. Mus. Paris, Ser. 2, VII. 97 (1884) et Pl. David. I. 287 (1884) —non Sieb. & Zucc.

A. dumosa var. *chinensis* Franch. in Journ. de Bot. XIII. 258 (1899).

A. chinensis Franch. in Journ. de Bot. XIII. 259 (1899); Bois in Journ. Soc. Hort. France, Ser. 4. I. 230 (1900).

Tsuga dumosa var. *chinensis*, E. Pritzel in Engl. Bot. Jahrb. XXIX. 217 (1900).

T. Sieboldii, E. Pritzel, l.c.; Masters in Journ. Linn. Soc. Bot. XXVI. 556 (1902) et XXXVII. 421 (1906) et in Journ. of Bot. XLI. 270 (1902) —non Carr.

T. Brunoniana var. *chinensis*, Masters in Journ. Linn. Soc. Bot. XXVI. 556 (1902).

T. yunnanensis, Masters in Gard. Chron. Ser. 3, XXXIX. 236, fig. 93 (1906) pro parte, et in Journ. Linn. Soc. Bot. XXXVII. 421 (1906) pro max. parte; Bean in Kew Bull. 1910, p. 176; Wilson, Veg. West. China, t. 489 (1911).

This conifer was discovered by Père A. David in the summer of 1869 on Hong shan tin, one of the mountains of Mupin in N.W. Szechuan. He calls it "Thié-cha-mou, sorte de Sequoia à bois très dur et qui porte, me dit-on, de petits cones."* He does not appear to have collected specimens of it on this occasion, as he did four years later, when, in March, 1873, he came across the same tree in the mountains of Ho shen miao, N.W. of Han chung in Southern Shensi. These specimens Franchet identified (1884) with *Abies Tsuga*, that is *Tsuga Sieboldii*, a Japanese species with glabrous branches, and later on (1899) tentatively with "*Abies* (*Tsuga*) *yunnanensis*." At the same time (1899)

* A. David in Nouv. Arch. Mus. Hist. Nat. X. Bull. p. 62 (1874).

he described specimens of the same tree, collected by the French Missionary Paul Farges in the district of Cheng Kow on the border of Shensi and Szechuan, as representing a new species, *Abies chinensis*, which, when transferred (1900) to *Tsuga*, became *T. chinensis*. Out of these conflicting determinations and partly also from the intrinsic difficulty of the discrimination of the species of *Tsuga* the confusion arose, which is reflected in the synonymy quoted above and in the practical nomenclature of gardens. When our Tsuga was introduced into horticulture by Messrs. Veitch, who had received seed from their collector, Mr. E. H. Wilson, from Hupeh (nos. 572, 1898), it was determined by Masters as *T. Sieboldii* (1902). Only four years later (1906) the same authority figured in the Gardeners' Chronicle a specimen, obtained by Wilson in Western Szechuan (no. 3014), as *T. yunnanensis*, identifying it at the same time with Wilson's Hupeh plants mentioned above and with Delavay's from Yang in chan (the summit of the Hee chan men range, halfway between Tali and Lichiang to Yunnan), which forms the basis of Franchet's *Abies yunnanensis*, that is *Tsuga yunnanensis*. In consequence of this the plants, which Messrs. Veitch distributed from Wilson's seed, may still be found to parade in gardens under one of the two names *T. Sieboldii* and *T. yunnanensis*, or where they were corrected on the authority of Rehder and Wilson, as *T. Sieboldii* and *T. chinensis*.

I have already referred to the differences between *T. chinensis* and *T. Sieboldii*, whilst those between our plant and *T. yunnanensis* are given in the Latin diagnosis and may, along with those which arise out of the comparison with *T. dumosa*, the only Himalayan *Tsuga*, be culled from the italicized portion of the English description. Paschke (1913) attempted to work out a key to the Old World species of *Tsuga* on anatomical characters, but as he does not specify the material from which he derived the distinctive characters and as his description is by no means clear, I am not able to follow up his conclusions. Miss Downie has more recently (1923) studied the anatomical structure of the leaves of the Chinese tsugas and I myself have examined leaves of all the Chinese specimens at my disposal. Miss Downie has come to the conclusion that the "anatomy of the leaf did not help very much in the systematic placing of the species" except

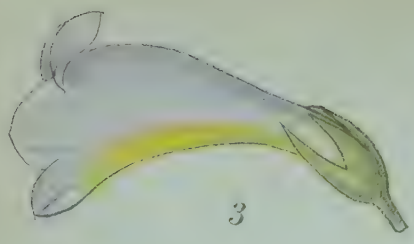
in so far as "the distribution of the hypodermal cells . . . . has proved quite a constant factor." Thus "in the *yunnanensis*-group hypodermal cells are practically absent," whilst in the *chinensis*-group all species show a large development of hypodermal cells in groups all along the upper surface or forming a continuous layer beneath the epidermis." My own observations have led to the same result, but with this qualification, that the leaves of specimens cultivated in this country have none, or only few, scattered hypodermal cells. Of the external morphological characters, the prevalent absence of marked white stomatic bands on the back of the leaves in *T. chinensis* may be mentioned, but this character is not absolutely reliable, as concolorous and discolorous leaves or intermediate states occur together in some of Wilson's samples (particularly in his no. 2096). The specimen here figured has also the leaves white underneath although obtained from a plant of Veitch's distribution, whilst the Kew plants of the same origin have hardly any wax covering on their underside. *T. chinensis*, as understood here, ranges, at elevations of 2,000–3,000 m. or on Pan-lan-shan to 3,800 m., from Southern Shensi and Western Hupeh to Northwestern and Central Szechuan, where it meets or possibly overlaps the area of *T. yunnanensis*, which extends southwards as far as Northwest Yunnan. Here, in the mountains of Likiang, specimens were collected by Forrest (no. 17169) which Miss Downie described as a new species, *T. Forrestii*. I was inclined to refer them to *T. chinensis*, with which they have the notched leaf-tips, the continuous hypodermal layer on the upper side of the leaves, and their green underside as well as the glossy hard-scaled cones in common, but the cones being distinctly more oblong than in typical *T. chinensis* and the scale-supporting bracts slightly different, I leave the question open for the present. In Shensi and Hupeh *T. chinensis* is, according to Wilson, usually a small dense pyramidal tree (5–20 m.), but tall specimens (up to over 30 m.) are occasionally found. In western Szechuan, however, where it abounds, very large loose and open specimens (up to 40 m. high with a girth of up to 6 m.) are common. The timber obtained from it is, though soft, considered very durable, hence the Chinese name Tieh-sha (Iron Fir). It is much used for making shingles and for roofing.

We are indebted for the material from which the plate was drawn to the Marquis of Headfort, in whose garden at Kells the tree flowered for the first time in 1926. Although female catkins were then and have since been produced, they have so far not ripened.

Description.—A dense, pyramidal *tree*, commonly up to 25 m. high, but locally much taller (up to 40 m.) and then loose and open; young branches light brown, more or less stiffly puberulous, particularly in the grooves. *Vegetative buds* obovoid, stout, about 5 mm. long, at length greyish-brown. *Leaves* pectinately arranged, *linear with a more or less emarginate blunt* tip and smooth or, when young, upwards sparingly and minutely spinulose margins, very variable in size, from 5–23 mm. by 2–2·5 mm.; the smaller on the upper side of the shoot, face dark green and shining with a median groove, *in adult plants with a continuous layer of hypoderma, back with two white stomatiferous bands or uniformly pale green*, midrib slightly raised. *Male Strobili* borne on slender stalks, which are supported by numerous small bracts, subglobose 4–5 mm. in diameter. *Anthers* as in figs. 5 and 6. *Female strobili* shortly to very shortly stalked, supported by numerous small bracts as in the male strobili, ovoid, purplish to dark purple, about 1 cm. long; " bracts " ovate to deltoid, obovate, shortly acuminate to obtuse and emarginate, denticulate, up to 3 mm. long. *Ovuliferous scales* suborbicular, about 8 mm. in diameter. *Mature cones subsessile or shortly peduncled*, mostly at a right angle to the bearing axis, *globose-ellipsoid or globose-ovoid* to *almost globose*, 2–2·5 cm. long; scales loosely spreading upwards, *suborbicular* (*the intermediate often wider than long*), up to over 12 mm. wide, hazel, *shining*, *rather woody* with a thin edge. *Seeds* obliquely obovoid, pale up to 5 mm. long or with the oblong obtuse wings up to 10 mm. long, the latter about 4 mm. wide.

Distribution.—Central China from Southern Shensi and Western Hupeh to Western Szechuan. O.S.

Fig. 1, a flowering male branch, nat. size; 2, part of it enlarged, × 2; 3, a leaf back view, × 4; 4, a male strobilus, × 3; 5 and 6, anther in front- and back-view, × 14; 7, a flowering female branch, nat. size; 8, a female strobilus, × 2·5; 9, bract and ovuliferous scale of the same, × 8; 10, ovuliferous scale with ovules, × 8; 11, a mature cone (from a herbarium species, Wilson, No. 1898), nat. size; 12–14, scales of the same, nat. size; 15 and 16, seeds, × 3.



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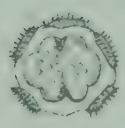

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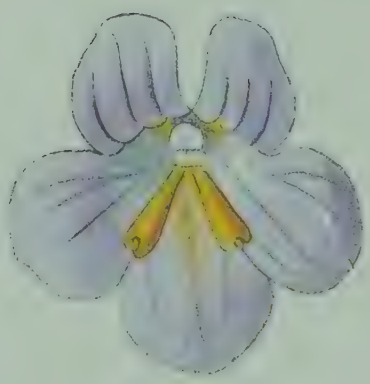

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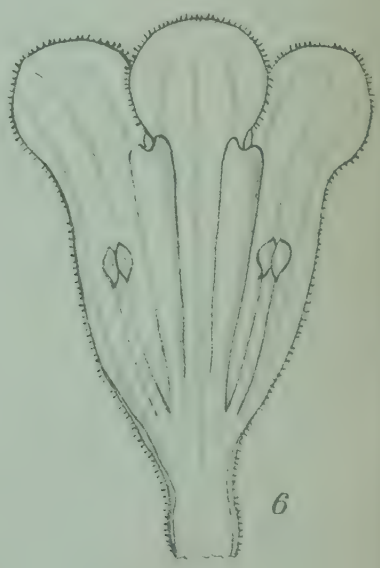

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C.Atkinson del. L.Snelling lith.

Tab. 9194.

OROBANCHE UNIFLORA, f. nana.

North America.

Orobanchaceae.

Orobanche, Linn.; *Benth. & Hook. f., Gen. Pl.* II. 984; *G. Beck in Engl. & Prantl, Nat. Pflanzenf.* IV. 3 *B.* 129.

Orobanche uniflora, *Linn., Spec. Plant.* 633 (1753); *Ed.* 2, p. 882 (1764); ab *O. fasciculata* Nutt., altera specie sectionis *Aphylli*, pedunculis ex axi primario vel eius ramis solitariis vel perpaucis, corolla violacea, calycis lobis e basi triangulari subulato-attenuatis distincta.—Gronovius, Fl. Virg. 96 (1762); Houttuyn, Handleid. IX. 560 (1778); Walter, Fl. Carol. 166 (1788); Poiret in Lam. Encycl. IV. 623 (1796); Willd., Spec. Plant. III. i. 352 (1801); Mich., Fl. Bor. Amer. II. 26 (1803); Pursh, Fl. Amer. Sept. II. 431 (1814); Barton, Prodr. Fl. Philad. 66 (1815) et Med. Bot. II. 229 t. 50 (1818) et Comp. Fl. Philad. II. Add. 218 (1818); Dict. Sc. Nat. Dicot. Bot. t. 29 (1816–1829); Bigelow, Fl. Boston, Ed. 2, p. 244 (1824); Darlington, Fl. Cestr. Ed. 2, p. 377 (1837); Torrey, Fl. New York, II. 23 (1843); Provancher, Fl. Canad. I. 448, fig. 213–218 (1862); G. Beck in Bibl. Bot. IV. No. 19, 7575, t.1 (1890) et in Engl. & Prantl, Nat. Pflanzenf. IV. 3 B. 130, fig. 56 B. (1893); Jepson, Fl. West. Middle Calif. Ed. 2, 389 (1911) et Man. Flow. Pl. Calif. 953 (1925).

Syn. *Orobanche biflora*, Nuttall, Gen. N. Amer. II. 59 (1818); Darlington, Fl. Cestr. 72 (1826); Hook., Fl. Bor. Amer. II. 93 (1838).

Thalesia sp. Rafin. in Amer. Monthly Mag. II. 267 (1818) et in Neogen. 3 (1825).

T. uniflora, Britton in Mem. Torr. Club. V. 298 (1894); Britton & Brown, Ill. Fl. N. States & Canada, III. 195 c. ic. (1898); Ed. 2, III. 233 c. ic. (1913); F. E. & E. S. Clements, Rocky Mt. Flow. t. 22 (1914); Armstrong, Field Book West. Wild Fl. 505 (1915); House, Wild Fl. New York (Mem. No. 15, N.Y. State Mus.) II. 259 (1918); Maxon in Contr. U.S. Nat. Herb. XXI. 255, t. 37 (1919).

Phelipaea biflora, Spreng., Syst. II. 818 (1825).

Anoplon biflorum, G. Don, Syst. IV. 634 (1838).

Anoplanthus uniflorus Endl., Ic. Gen. Pl. p. xii. t. 72 (1838); Lindl., Veg. Kingd. 609, fig. 412 (1846); Reuter in DC. Prodr. XI. 41 (1847); Wight, Ill. Ind. Bot. II. t. 158 bis, fig. 3 (1850); Chatin, Anat. Veg. 84, Atl. t. 19 (1856).

Aphyllon uniflorum, Gray, Man. Bot. Ed. 1, p. 290 (1848), Ed.4, p. 281(1863) et Ed. 5, p. 323 (1867) et Synopt. Fl. N. Amer. II. 312 (1886) et in Rep. Bot. Exped. (Expl. & Surv. Railr. Mississippi to Pacific) IV. 118 (1856); et Bot. Calif. 584 (1876); Torrey, Bot. Bound. Surv. 110 (1858); Meehan, Nat. Flow. U.S. Ser, 3, II. t. 22 (1880) et in Proc. Acad. Nat. Sc. Philadelphia, 1881, p. 160; Drew in Bull. Torr. Bot. Club, XVI. 150 (1889); F. W. Anderson, ibid. 215; Wild Fl. Canada, t. 243 (1894); A. C. Smith in Bot. Gaz. XXVII. 122 (1899) et in Contr. Bot. Lab. Univ. Pennsylv. II. ii. 111–121, t. 13, 14, 15 (1899); Parsons, According to Season t. 16 (1902).

A. minutum, Suksdorf, in Deutch. Bot. Monatschr. XVIII. 155 (1900).

A. Sedi, Suksdorf, l. c.

The plant figured here belongs to the smallest of the broom-rape species and represents an unusually dwarf state of this variable type. *Orobanche uniflora* inhabits a wide area in North America, ranging from the Pacific to the Atlantic coast from about 30°—55° N. Its host plants are asters, artemisias and solidagos in the Eastern States and *Sedum stenopetalum* and a species of *Tellima* in the western section of its area. It varies very much in height and branching and

in the size of the flowers and apparently also in the colour of its corollas which are usually described as violet, but also as white (Barton) or purplish white (Bigelow and Darlington) or white with bluish veins and borders (Torrey). It seems that white or whitish flowers are common in the Atlantic States, whilst violet flowers are characteristic of the West. How far these variations depend on the host plant, is still unknown, but it stands to reason to assume that strong host-plants will favour the development of the parasite into taller and more branched plants. Our plant was raised by Sir William Lawrence in his garden at Burford near Dorking, by sowing it with seeds of a small and very delicate species of *Sedum*. This may account for its reduced dimensions. In all other respects, Sir William's plants were perfectly normal and they very much resemble field specimens, collected, in association with a species of *Sedum*, by Wm. C. Cusick, on Mt. Emily in Eastern Oregon (no. 2396). A short sketch of the life history of *O. uniflora* was given by Miss Amelia C. Smith who studied its morphology and development on *Aster corymbosum*. The connection between the parasite and a root of the host is effected by relatively large haustoria whose "parenchyma spreads and mingles with the parenchyma of the host so intimately that it is impossible to distinguish their boundaries." Outside of, and close, to the host plant, bundles of short smooth roots are formed from the base of the vegetative axis. These are followed higher up by a succession of 5—7 closely appressed boat-shaped scale-leaves, the lower of them being somewhat fleshy. They are all, in our plant, perfectly glabrous, with the exception of the uppermost which is slightly glandular-ciliolate. Each of these scale-leaves bears a bud in its axil. In strong plants the lowest of these buds may give rise to branches or even systems of short branches, whilst those following may or may not grow into long-stalked flowers. The vegetative axis varies much in length (from a few millimetres to 5 or even 12 cm. and in size (in strong individuals up to over 6 mm. in diameter), the scale-leaves, whose number seems to be limited, being accordingly closely or loosely arranged. The primary axis grows into a slender erect pedicel bearing an ebracteate flower, as do the upper secondary ones, if they are not arrested, the pedicels considerably exceeding the vegetative part of the axis in length.

The wide range of quantitative fluctuation in *O. uniflora*

has long been recognized, but about thirty years ago Suksdorf proposed two new species (*Aphyllon minutum* and *A. sedi*) which, if accepted, would reduce this range. They are of special interest in this place in so far as they approach nearest to Sir William Lawrence's plant with which they share the extreme reduction in size ; but as neither Suksdorf's nor Sir William's plants exhibit any characters, which might be considered to distinguish them qualitatively from the common more robust type of *O. uniflora*, we can only speak of them as dwarfed states (*formae nanae*) of this species. In the Latin diagnosis I have already referred to the affinity of *O. uniflora* with *O. fasciculata*, another North American species of similar, but more restricted distribution. As the two species are sometimes confused, it may be pointed out that *O. fasciculata* is generally a stronger plant with a more elongated vegetative axis which normally produces flowers from several of the upper scale-leaves or bracts, so that the flowers become " fascicled " at the top of the axis, and that it has shorter, more broadly triangular calyx-teeth and a corolla, which is mostly described as yellow or yellow with a tint of red or purple. *O. uniflora* and *O. fasciculata* form a very natural and well defined group within the genus *Orobanche*, characterized by the long pedicels and the absence of bracteoles. It was probably the peculiar habit of these two plants, due to the elongation of the pedicels, that originally suggested their generic segregation from Orobanche as *Aphyllon* by Mitchell and as *Thalesia* by Rafinesque. Wallroth in his " Orobanches Generis ΔΙΑΣΚΕΥΗ " (1825) seems to have been the first to draw attention to the absence of bracteoles in *O. uniflora*, and he was so much impressed by this character and its combination with the elongation of the pedicels that he proposed a special group for it, which he referred as a " Tribus " to *Orobanche*, as it agreed otherwise in its floral structure with this genus. Unfortunately he also included in it a very different plant, *Orobanche coccinea* M. Bieb., that is *Phelipaea foliata* (see Bot. Mag. t. 8615). This " tribe " was raised to generic rank, as *Anoplon*, by G. Don and as *Anoplanthus* by Endlicher, both in 1838. The names *Anoplon* and *Anoplanthus*, however, as applied to our plant and to *O. fasciculata*, were soon superseded in the American literature by J. Mitchell's name *Aphyllon* (Plant. quaed. Gen. Virgin. 1741, reprinted 1763). This long held the field, but was eventually replaced by Dr. Britton (1894)

and others by *Thalesia*, a name proposed without any generic description by Rafinesque. Professor G. Beck in his elaborate monograph of *Orobanche* (1890) has pleaded for the reduction of *Aphyllon* to a section of *Orobanche*, and I have followed him here.

I would finally observe that the experiment of growing *O. uniflora* in an English garden was successfully made once before, when in 1914 Mr. G. Reuthe in his nursery at Keston raised it from seed brought from Labrador. As the plant readily produces seed, there should be no difficulty in growing it in pots or in the open, provided it is given an appropriate host to fasten up on.

DESCRIPTION.—An annual parasite on the roots of composites (*Aster*, *Solidago*, *Artemisia* and species of *Sedum*), minutely glandular puberulous in all parts above ground. *Vegetative axis short to very short* (*8 c.m. to 4 c.m.*) with a succession of scale-leaves bearing buds in their axils, the lower of these growing into branches, *whilst the following are early arrested, except the uppermost 1 or 2* (*rarely more*), *which grow into flowers*. *Scale-leaves* 5—7, closely or loosely disposed, boat-shaped, rounded on the back, subobtuse to very obtuse, the uppermost often minutely 3-toothed at the top, from 2—15 mm. long, yellowish-white to brownish, the lowest somewhat fleshy, glabrous or the upper sparingly and minutely glandular-ciliolate. *Pedicels* 1—4 (mostly 1 or 2), slender, 2—12 cm. long, ebracteate. *Calyx* ovoid, 5—10 mm. long, deeply 5-cleft; *lobes lanceolate-subulate from a triangular base*. *Corolla* bilabiate; tube trumpet-shaped, more or less curved, 12—20 mm. long; upper lip reflexed, deeply 2-lobed, lower lip much larger, 3-lobed with two raised folds over the inner commissures, these bright yellow or orange, *the remainder of the corolla white, lilac to deep violet*. *Filaments* inserted low down in the tube, about 5 mm. long, glabrous. *Anthers* slightly over 1 mm. long; anther-cells apiculate at the base. *Ovary* ellipsoid; style glabrous; stigma whitish 2-lobed. *Capsule* subglobose, up to over 5 mm. long, enclosed in the persistent corolla and calyx.

DISTRIBUTION.—North America, 30°—55° N. from the Pacific to the Atlantic.

O.S.

Figs. 1 and 2, whole plants parasitic on *Sedum sp.*, nat. size; 3, a flower, × 2; 4, a corolla in front-view, × 4; 5, upper lip and posticous portion of corolla tube, × 3; 6, lower lip and anticous portion of corolla tube, × 3; 7, calyx and pistil, × 3; 8, cross-section of stem, × 10.

Tab. 9195.

RHODODENDRON GRIERSONIANUM

China.

Ericaceæ. Tribe Rhododendreæ.

Rhododendron, Linn.; *Benth. & Hook. f., Gen. Plant.* III. 599; *Drude in Eng and Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron Griersonianum, *Balf. f. & Forrest in Not. Bot. Gard. Edinb.* X. 16 (1919); species præcipua, nulli arcte affinis, corolla colore splendido fere cinnabarino, inferne anguste tubulosa subabrupte in limbum vix obliquum expansa, extra pilis aliis ramulosis aliis simplicibus glanduligeris lanato-villosa distincta.—Millais, Rhododendrons, Ser. 2, p. 149, c. ic. (1924); Gard. Chron. Ser. 3, LXXXV. 359, 372, fig. 156 (1924); Journ. Roy. Hort. Soc. L. p. l. (1925).

An outstanding species whose affinity has not yet been ascertained. As in the case of other rhododendrons, it is hardly to be sought in a straight line of ancestors, but rather in a net of hybrid relationship, into which the "series" of the "*Barbatæ*" and "*Auriculatæ*" probably enter. However this may be, it is certainly one of the most brilliant rhododendrons which Mr. Forrest has given us. It appears to be somewhat tender, but it does well in Cornwall and has also flowered in a few gardens in Sussex, Hampshire and Berkshire. Its relative delicacy is possibly connected with its more southern home on the Yunnan-Burma frontier, where, in 1917, Forrest discovered it in the Shweli Valley at 2,700 m. in 25° 20′ N. It inhabits there open situations in pine and mixed forest, growing mostly singly and not gregariously as is the rule with rhododendrons. It forms, according to Forrest, a symmetrical shrub, 0·75–2·5 m. high and produces loose trusses of flowers whose colour Forrest describes as "a most beautiful shade of soft rose scarlet, almost vermilion in sun-light." The plant which served as model for our plate was raised at Kew from seed collected by Forrest (No. 874) and communicated by Mr. Lionel de Rothschild in 1920. It is usually in flower in June.

Description.—A more or less pyramidal *shrub*, up to 2·5 m. high; young branches villous, the tomentum whitish to tawny, consisting of soft branched hairs and long-stalked glands and more or less persisting into the second year. *Leaf-buds* acute; perules more or less subulate, the inner almost spinescent, woolly outside, glossy inside, over 1 cm.

long. *Leaves* stalked and loosely disposed in the upper part of the year's growth; blades lanceolate from an acute or subobtuse base, shortly and acutely acuminate, 11–14 cm. by 2·5–3 cm., coriaceous, pale green and softly woolly when unfolding, soon becoming glabrous and mat-green on the face, but more or less permanently covered with a buff-coloured felt on the back, margins slightly recurved, midrib impressed on the face, prominent on the back, lateral nerves 14–16 on each side; stalks 1·5–2·5 cm. long, reddish when young, grooved, with a tomentum like that of the young branches, at length glabrescent. *Raceme* loose, of 5–6 (rarely up to 10) long-stalked, drooping, fragrant flowers, all its parts whitish to reddish-brown, with a soft woolly glandular tomentum; rhachis up to over 2 cm.; bracts (fertile) linear, up to 5·5 cm. long, membranous; bracteoles subulate or filiform, up to 2 cm. long; pedicels up to 3·5 cm. long. *Calyx* small, with 5 broadly triangular or rounded teeth, densely glandular-tomentose. *Corolla* soft, carmine to vermilion, rather narrow and cylindrical for 2–2·5 cm. (6–8 mm. in diameter) from a slightly gibbous base, then passing into a widely spreading, funnel-shaped limb, 5–6 cm. across, densely covered without with soft branched hairs interspersed with long-stalked glands, finely pubescent within; lobes 5, elliptic-oblong, obtuse, 2–2·5 cm. by 1·5–1·7 cm., the uppermost sometimes with a few darker spots, the tomentum of the tube extending to a reduced degree almost to the tip of the lobes. *Stamens* 10, unequal, included in the tube; filaments up to 4 cm. long, puberulous from the base up to about one-half or more of their length; anthers 2·5 mm. long. *Ovary* conical, truncate, deeply grooved, densely appressedly tomentose with a few scattered gland-tipped hairs, especially at the apex; style far exceeding the anthers, slender, sparingly hairy at the base, red; stigma black-red, slightly lobed, discoid. Capsule unknown.

Distribution.—China. Southwestern Yunnan.

O.S. & F.B.

Fig. 1, flowering branch; 2, leaf in back view; 3 and 4, hairs, representing the two types of which most of the indumentum of the plant is composed; 5, corolla opened out; 6 and 7, filament (base and top with anther); 8, calyx and ovary with base of style; 9, top of style and stigma. Figs. 1, 2, 5, nat. size; 3, 4 × 20; 6, 7, 9, × 8; 8 × 4.

L. Snelling del. et lith.

Tab. 9196.
PRIMULA CAWDORIANA.
Tibet.

Primulaceæ. Tribe Primuleæ.

Primula, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 631; *Pax in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 105 et *in Pflanzenreich*, IV. 237. 17.

Primula Cawdoriana, *F. Kingdon Ward in Not. Bot. Gard. Edinb.* XV. 87, 96 (1926) et *in Journ. Roy. Hort. Soc.* LII. 22, p. lvi. (1927); *P. Buryanæ*, Balf. f. affinis, sed scapo floribusque præter pilos farinipotentes glabris atque corollæ lobis angustis distincta.—W. W. Smith & Forrest in Not. Bot. Gard. Edinb. XVI. 40 (1928) et in Journ. Roy. Hort. Soc. LIV. 36, 37, fig. 40 (1929); H. D. McLaren in Journ. Roy. Hort. Soc. LIV. 67 (1929); N. K. Gould, ibid., 75 (1929).

One of the most charming, but short-lived and therefore disappointing introductions of primulas of late years. Discovered only as far back as 1924 it has, having run its short life-cycle, apparently already disappeared from our gardens. It shares in so far the fate of the other members of the *Soldanelloides*-Section who all seem to be doomed to extinction under the ordinary conditions of cultivation. Concerning the causes of this disconcerting fact I would refer to the article in the Magazine on *Primula siamensis* (t. 9100).

P. Cawdoriana was discovered by Capt. F. Kingdon Ward on his expedition to the Tsang-po in 1924 and named by him after his companion Lord Cawdor. It was found growing in abundance "on steep rocky earth-slopes on the sheltered side" of cliffs on the Temo-la between 3,600 and 4,200 m. and "on alpine slopes amongst dwarf Rhododendron, Cassiope, etc.," on the Nyima La between 4,200 and 4,500 m. both passes being situated in the divide of the Tsang-po and the Rong chu, the latter a tributary of the Tsang-po, approximately between 29° 35′ and 29° 38′ N. by 94° 35′ and 95° 55′ E. It is the same district whence *Meconopsis Baileyi* came, a region of dry winters and wet summers with a rich alpine flora in the alpine belt.

The accompanying plate was prepared in 1926 from a plant raised from Kingdon Ward's seed (no. 5741) in the Royal Botanic Gardens, Kew. Two years later the plant had disappeared, and the same has happened at Wisley to the plants grown there. I may add that Mr. A. K. Bulley of Nesden, Chester, received an Award of Merit for some very fine specimens which he exhibited at the Royal Horticulture Meeting of May 25th, 1926.

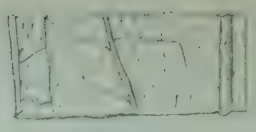
Description.—A biennial(?) *herb*. *Leaves* very shortly stalked, forming depressed rosettes; blades obovate, oblanceolate or spatulate, subacute to obtuse from a wedge-shaped base, mostly 2–3·5 cm. long by 1–1·5 cm. wide, irregularly serrate-dentate, ciliolate, covered with white glandular hairs on both sides, those on the back very short except along the midrib and nerves, where they are much longer; petiole 5–10 mm. long, slightly winged. *Scape* solitary, 11–18·5 cm. high, somewhat mealy, particularly near the flowers. *Bracts* few, linear to lanceolate, acute, up to 3 mm. long, thinly membranous, whitish. *Flowers* 3–6 in a head, deflexed, sessile. *Calyx* widely cup-shaped, 6–8 mm. long, divided down to one-third or one-half into 5 or 6 lobes, green or green flushed with black-purple, more or less mealy; lobes often unequal, oblong, obtuse, entire or toothed. *Corolla* funnel-shaped, up to 2 cm. long; tube narrowly cylindrical for 7–8 mm., then suddenly inflated and passing gradually into the obliquely spreading limb, greenish white below, violet mauve above, more or less mealy, at least at the base; limb up to 1·8 cm. across, violet mauve, with a large white eye, 5-cleft; lobes oblong, 5–7 mm. long, cleft for 2–3 mm. into 2 (rarely 3) linear or triangular lobules. *Stamens* in the thrum-eyed state 7–8 mm. from the base of the tube, anthers 1·5 mm. long. *Ovary* globose; style in the thrum-eyed state 1·5–2 mm. long, stigma capitate. *Capsule* unknown.

Distribution.—South Eastern Tibet. Basin of the Tsang-po.

O.S. & F.B.

Fig. 1, a whole plant, nat. size; 2, an inflorescence with 3-dentate corolla-lobes, nat. size; 3, a rosette of leaves, nat. size; 4, a portion of the back of a leaf, with the fine indumentum between the veins omitted, × 4; 5, a flower in side view, ×2; 6, the same in longitudinal section × 2.

1



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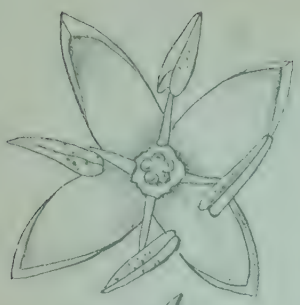

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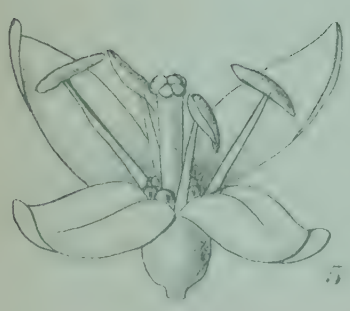

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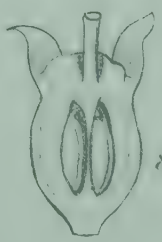


8

L. Snelling del. et lith.

Tab. 9197.

CORNUS PAUCINERVIS.

China.

Cornaceæ. Tribe Cornèæ.

Cornus, Linn.; *Benth. & Hook. f., Gen. Plant.* I. 950; *Harms in Engl. & Prantl, Nat. Pflanzenf.* III. 8. 265; *Wangerin in Pflanzenreich*, IV. 229. 43.

Cornus paucinervis, *Hance in Journ. Bot.* XIX. 216 (1881); foliis plerumque lanceolatis (raro ad ellipticum vergentibus) in dorso nervis eximie prominentibus utrinque 2-nis vel 3-nis margini subparallelis bene distincta, a *C. Walteri*, Wang. et *C. sanguinea*, Linn. præterea sepalis elongatis discum superantibus, ab ultima insuper pilis brevioribus strictis diversa.—Forbes & Hemsley in Journ. Linn. Soc. Bot. XXIII. 346 (1888); Koehne in Gartenfl. XLV. 237, 287, 285 fig. 3 (1896) et in Mitt. Deutsch. Dendr. Ges. XII. 46 (1903); Harms in Engl. Bot. Jahrb. XXIX. 506 (1900); Wilson in Gard. Chron. Ser. 3, XXXVIII. 125 (1905) et Natur. in W. China, I. 89 (1913) et China, Mother of Gardens, 96 (1929); J. H. Veitch, Hort. Veitchii, 361 (1906); C. K. Schneider, Ill. Handb. Laubholzk. II. 449, fig. 297, 298 (1909); Wangerin in Pflanzenreich, IV. 229. 72, fig. 18 A–E (1910); Pampanini in Nuov. Giorn. Bot. Ital. N. Ser. XVII. 681 (1910); Gard. Chron. Ser. 3, L. 94, fig. 45 (1911); Gard. Mag. LIV. 593 c. ic. (1911); Journ. Roy. Hort. Soc. XXXVII, p. cxlvi (1912); Léveillé, Fl. Kouy-Tcheou, 116 (1914); L. H. Bailey, Stand. Cycl. Hort. II. 853 (1914); Rehder in Sargent, Pl. Wilson. II. 576 (1916); Bean, Trees and Shrubs Hardy, Brit. Isles, Ed. 3, I. 392 (1921); Besant in Gard. Chron. Ser. 3, LXXII. 269 (1922); Rehder, Man. Cult. Trees & Shrubs, 671 (1927); Handel-Mazzetti, Naturbilder, Südwest-China, 286, 309 (1927).

Syn.: *Cornus quinquenervis* Franch. in Journ. de Bot. X. 307 (1896); Koehne in Mitt. Deutsch. Dendr. Ges. XII. 46 (1903).

This ornamental shrub, which is so widely spread over China, was known to botanists long before it became a recognized introduction in gardens. It was discovered almost simultaneously by W. Mesny, a native of Jersey and a general in the Chinese Army, near Liu chow fu (24° 5′ N. by 109° 20′ E.) in Kwangsi in 1897 and by Thomas Watters, of the Consular Service, near Ichang in Hupeh in 1880. It is from their collections that Hance described our plant in 1881. Henry, the Rev. P. C. Silvestri and Wilson subsequently established its general distribution in this part of Hupeh up to the Honan frontier, whilst Faber, Wilson and von Rosthorn proved its wide range through East and Central Szechuan as far as Mt. Omei. Wilson, speaking of its occurrence in the Pa-chou District, calls it a typical "fluviatile shrub." Other collections also record it from Kwei-chou, and from Yunnan as far as the neighbourhood of Tali-fu (Delavay and Maire) and of Mengtse (Henry), and here, too, the plant mainly follows the streams. Franchet, who had evidently not seen Hance's originals of *C. paucinervis*, described (1896) Delavay's specimens from Tapin-tze as *C. quinquenervis*. They differ,

however, in no way from those collected by Mesny in Kwangsi. The gap between the Hupeh-Szechuan and the Yunnan-Kwangsi sections of the area of *C. paucinervis* has recently been filled by Léveillé's and Handel-Mazzetti's records of the plant from Kweichou. Speaking of the flood-belt of the Yitze ho, a tributary of the Beida ho, which forms the frontier between Kweichou and Kwangsi, Handel-Mazzetti says "Although often flooded, the supple shrubs, as of *Cornus paucinervis*, *Ficus piriformis* and *Distylium chinense*, find here still favourable conditions of growth." Similarly, referring to the floods of the Du-djiang (Tu-Kiang), which may rise to 7 m., the same keen observer described the riparine belt of the river as formed of supple-branched shrubs of man's height which withstand the submersion and the rush of the water without injury, enumerating especially willows, figs, myrtles, *Distylium chinense*, *Cornus pauciflora*, *Adina globifera* and, on rocks, *Buxus Harlandii*. I may add that Wilson also records the association of our *Cornus* with *Distylium* under similar conditions for Eastern Szechuan. Although *C. paucinervis* appears to ascend nowhere beyond the subtropical or warm temperate zone (Hupeh to 1,100 m.; South Yunnan to 1,800 m.) it has proved perfectly hardy in Great Britain and Ireland, no doubt owing to the adaptation of its root-system to the relatively low temperatures of the soil of the river-beds. It was introduced through Wilson from seed-collected in Hupeh in 1900 for Messrs. Veitch, and again in 1907 for the Arnold Arboretum, and it flowered in this country with the Hon. Vicary Gibbs at Aldenham, Herts., in 1911. At Kew it produces its rich fragrant corymbs of white flowers late in July and in August, but it fruits only sparingly. A supposed hybrid between *C. paucinervis* and *C. amonum*, a North-American species, was described by Rehder (1924) under the name of *C. dubia*. It appeared in a sowing of *C. paucinervis* in the Arnold Arboretum.

Description.—A *Bush* up to 3 m. high. Young stems often reddish, quadrangular with scattered appressed two-armed hairs, at length glabrescent, older branches terete with a smooth purplish-brown bark. *Leaves* opposite; blades ovate-elliptic to lanceolate, acute or acuminate, rarely obtuse or rounded, from a wedge-shaped base, mostly 3·5–5·5 cm. (rarely up to 10 cm.) long by 1·2–3·2 cm. (rarely

up to 4 cm.) wide, papery, dull deep green above with scattered 2-armed hairs, paler on the back with a similar tomentum, margin entire, midrib and nerves scarcely or slightly impressed on the face, prominent below, 2–3 pairs of lateral nerves running almost parallel to the margin ; petioles up to 0·7 cm. (rarely to 1 cm.) long, channelled above. *Flowers* fragrant, in terminal many-flowered, subglobose, corymbose cymes, 3–7 cm. across ; peduncles and pedicels covered, sometimes densely, with appressed 2-armed often silvery hairs. *Pedicels* up to 5 mm. long. *Receptacle* turbinate, more or less densely covered with an appressed silvery tomentum. *Sepals* green, triangular or lanceolate-triangular, 1–1·5 mm. long, more or less connate for a short distance at the base, more or less tomentose. *Petals* white, somewhat fleshy, ovate-lingulate, appressedly tomentose without, 4-5 mm. long by 1·5–2 mm. wide. *Disc* 4-lobed, fleshy. *Stamens* 4 ; filaments slightly shorter that the petals ; anthers versatile, 2·25–2·5 mm. long. *Ovary* 2-celled, with 1 pendulous ovule in each cell ; style 2·5–3 mm. long, clavate ; stigma truncate, lobed. *Drupe* globose, 5–8 mm. in diameter, black, usually crowned by the persistent sepals ; stone obscurely and obtusely ribbed.

DISTRIBUTION.—China. From Yunnan and Kwangsi to Szechuan and Hupeh. O.S. & F.B.

Fig. 1, a flowering branch, nat. size ; 2, part of the underside of a leaf, × 3 ; 3, a bud, × 3 ; 4, a flower seen from above, × 4 ; 5, a flower in side-view, × 5 ; 6, stamens, × 7 ; 7, a flower, with the corolla removed, × 5 ; 8, the same in longitudinal section, × 5.

W.E.Trevithick del L.Snelling lith.

Tab. 9198.

PHALÆNOPSIS VIOLACEA.

Malaya.

Orchidaceæ. Tribe Kerosphæreæ.

Phalænopsis Bl.; *Benth. & Hook. f., Gen. Plant.* III. 573; *Pfitzer in Engl. & Prantl, Nat. Pflanzenf.* II. 6. 211.

Phalænopsis violacea Hort. Bogor. ex H. Witte in Flore Jard. Roy. Pays-Bas, II. 127(1859), nomen; IV. 129, c. ic. (1861); affinis *P. sumatranæ* Korth. et *P. Luddemannianæ* Reichb. f., a quibus scapo sæpissime paucifloro, colore florum et lobo intermedio labelli calvo facile distinguenda.—Teysmann & Binn. in Naturk. Tijdskr. Ned. Ind. XXIV. 320 (1862); Reichenbach f. in Gard. Chron. X. 234 (1878); Gard. Chron. X. 116, 507 (1878) et XVI. 144, fig. 32 (1881); Floral Mag. N. Ser. 1879, t. 342; J. Douglas in Gard. Chron. XVI. 108, fig. 25 (1881); Journ. Hort. Ser. 3, V. 155 c. ic. (1883) et XLII. 537 (1901); Warner & Will. Orch. Album, IV. t. 182 (1885); Ill. Hort. XXXII. 173, t. 576 (1885); Rolfe in Gard. Chron. XXVI. 277 (1886); Lindenia, VII. t. 303 (1891); Veitch, Man. Orch. Pl. Pt. 7, p. 41, c. ic. (1891); E. S. Berkeley in Orch. Rev. I. 242 (1893); Hooker f., Fl. Brit. Ind. VI. 29 (1894); Williams, Orch. Growers Man. Ed. 7, p. 674, c. ic. (1894); Teysmannia, V. 486, t. 7 (1894); Ridley in Journ. Linn. Soc. Bot. XXXII. 352 (1896) et Fl. Malay Penins. IV. 156 (1924); Winkler in Ann. Jard. Bot. Buitenzorg, XX. 9 (1905), in obs.; Fitting in Zeitschr. für Bot. I. 10, figs. 8–13 (1909); Orch. World, 1. 32, c. ic. p. 30 (1910); J. Gorbing in Gartenwelt, XVII. 662, c. ic. (1913); Oesterr. Gart. Zeit. IX. 185, fig. 77 (1914); H. Jirasek in Gartenwelt, XIX. 181, c. ic. (1915); Schlechter, Die Orchideen, 547 (1915); Orch. Rev. XXXIII. 113, c. ic. (1925).
Syn.: *Stauritis violacea* Reichenbach f. in Hamb. Gartenzeit. XVIII. 34 (1862).
Stauropsis violacea Reichenbach f., Xenia Orch. II. 7 (1862).

The genus *Phalænopsis* contains several species which are among the most beautiful of cultivated orchids, not only as regards the individual flowers, but also in the profuseness of their flowering, plants of *P. Schilleriana*, for instance, having been recorded with over 170 flowers on a single inflorescence. The subject of the present plate, however, belongs to a section of the genus (§*Zebrinæ* Pfitzer) in which the flowers are less conspicuous and, on the whole, few in number. In addition to this, the middle lobe of the lip is relatively narrower and undivided, while the sepals, and particularly the petals, are narrow. In *P. violacea* the number of flowers on a single inflorescence is usually small and of these only one or two are open at any one time. The colour of the flower, however, compensates for these disadvantages, making the species one of the most attractive of this group of the genus. There are a number of colour varieties, some of which have been given names; the present illustration probably representing var. *Murtoniana* Reichb. f., which is characterized by the deeply coloured inner halves of the lateral sepals and the orange side-lobes of the lip.

Phalænopsis violacea was first discovered in the neighbourhood of Palembang, in southern Sumatra, by Teysmann, and sent by him in 1859 to the Leiden Botanic Gardens, where it flowered in 1861, as it also did in Amsterdam at the house of Herr Willinck. The next record of the species dates from 1878, when specimens sent by Mr. Murton, of the Singapore Botanic Gardens, were brought to flower by Messrs. Veitch and by Mr. M. H. Williams, of Tredrea, Cornwall. Two years later Veitch received a further consignment of plants from southern Sumatra, collected by Curtis, and the species has been in constant cultivation from that date. In 1893 it was recorded by Major-General Berkeley from Perak in the Malay Peninsula, whence it has been imported since by several collectors. Statements have been made to the effect that *P. violacea* occurs also in Borneo, but up to the present the writer has discovered no authentic record from that island.

Little has been published about the habitat of the species, but Schlechter states that it occurs on the trunks of trees along the banks of the rivers in the lowland forests of Sumatra, and that it is often associated with *P. sumatrana* Korth. and *P. cornu-cervi* Reichb. f. With these two species, which are closely allied to *P. violacea*, it hybridises easily, and natural hybrids, of which *P. Valentinii* Reichb. f. is one, have been recorded from both Sumatra and Perak.

P. violacea may be grown successfully in the same way as most other species of *Phalænopsis*, being particularly effective in a hanging basket.

The subject of the present plate was cultivated at the Royal Botanic Gardens, Kew; its origin is unknown.

Description.—*Stem* very short and thick, up to 1 cm. in diameter. *Leaves* usually 3–4, elliptical or obovate-elliptical, usually obtuse and emarginate, sometimes subacute, narrowed at the base and very shortly clasping the stem, up to 25 cm. long and 9 cm. broad, coriaceous, the midrib a little sunken above. *Inflorescence* up to 30 cm. in height, but usually much shorter, *normally a few-flowered and simple raceme*, but sometimes with several branches bearing a dozen flowers in all; bracts lanceolate, acuminate, concave, 4–6 mm. long; flower stalks slender, 2–4 cm. long. *Dorsal* sepal lanceolate, acuminate or apiculate, 2–3 cm. long, *greenish yellow with a pink base* inside; lateral sepals slightly falcate,

acuminate, widest along the middle, just over 3 cm. long, having in the variety figured here a *green outer half or margin whilst the inner half is deep pinkish-red or pale wine-coloured.* *Petals* slightly shorter and broader than the dorsal sepal, slightly oblique, obtuse to acute, similar in colour to the dorsal sepal. *Lip* deeply three-lobed; *lateral lobes* turned up towards the column, triangular, 7 mm. long, with a reflexed awl-shaped protuberance or awn at the inner apex, mainly *bright orange but the awns and upper edge wine-coloured; middle lobe* narrowly obovate-rhomboidal, acute, 15 mm. long, 6 mm. wide above the middle, *deep wine-colour* except the white tip; *callus long, club-shaped, arising from a triangular truncated prominence in the centre of the hypochile and terminating just behind the apex.* *Column* expanded into broad shoulders below, terete above, arched over the lip, 7·5 mm. long, pale wine-coloured. *Pollinia* sessile on the upper surface of the stipe; stipe bent slightly over the convex-surface of the anther, strap-shaped, much widened above and bearing two sickle-shaped appendages at the base, one on either side of the gland, these being reflexed over the stigma; gland almost circular.

Distribution.—Sumatra and Perak.

V. S. Summerhayes.

Fig. 1, a flowering plant, nat. size; 2, a single flower, seen in three-quarter profile, nat. size; 3, lip in front-view, ×2; 4, column, from the front, × 2; 5, anther-cap in side-view, × 3; 6, 7 and 8, pollinia in front-, back- and side-view respectively, × 6.

L. Snelling del. et lith.

Tab. 9199.

RANUNCULUS FICARIA GRANDIFLORUS.

Mediterranean Basin.

Ranunculaceæ. Tribe Ranunculeæ.

Ranunculus, Linn.; *Benth. & Hook. f., Gen. Plant.* I. 5 (1862); *Prantl in Engl & Prantl, Nat. Pflanzenf.* III. 2. 64 (1888).

Ranunculus Ficaria grandiflorus, F. Schultz in Archives de Flore, 123 (1855) a planta vulgari boreali partibus omnibus majoribus distinguitur.—Strobl in Oesterr. Bot. Zeitschr. XXVIII. 109 (1878).

Syn.: *Ranunculus Ficaria* b. *calthifolius* Gussone, Fl. Sicul. Synopsis II. 4 (1843) pro parte; Gard. Chron. III. 179 (1875).

R. Ficaria β *ficariiformis* Fiori & Paol. Fl. Anal. Ital. I. 506 (1898).

R. calthifolius Jord., Observ. fasc. vi. 2 (1847); Boiss. Fl. Orient. I. 24 (1867), non Bluff et Fing., Comp. Fl. Germ. ed. 2, I. ii. 295 (1837).

R. ficariiformis F. Schultz in Archives de Flore, 123 (1855); Rouy et Fouc., Fl. de France I. 73 (1893).

Ficaria grandiflora Robert, Pl. Phan. Env. Toulon 57, 112 (1838); Gard. Chron. XVII. 372 (1882); Halácsy, Consp. Fl. Graec. I. 26 (1900) et Suppl. 3 (1908).

F. calthifolia Gren. et Godr., Fl. de France I. 39 (1848).

F. ranunculoides γ *grandiflora* F. Schultz in Archives de Flore, 123 (1855).

F. Robertii F. Schultz in Archives de Flore, 346 (sec. Indicem Kewensem).

Ficaria verna var. *calthifolia* Burnat, Fl. Alpes-Marit. I. 41 (1892) excl. syn. pro parte.

F. verna var. *grandiflora* Hayek, Prodr. Fl. Penins. Balc. I. 327 (1924).

The lesser celandine is an abundant plant in woods, brush-woods, and damp shady grasslands in this country and in most of Europe and the Mediterranean Basin. It reaches in the north-west to the Faeroes and occurs in the outlying island of St. Kilda. It not uncommonly proves a bad weed in gardens and arable land, and is so regarded at Kew. Nevertheless even the common plant as represented by the varieties in the British Isles is beautiful when in flower in the early spring and any greater beauty claimed for the plant here figured is solely due to the larger size of its flowers.

The taxonomy and nomenclature of the more or less easily recognizable units within the species as a whole is very perplexing in the absence of experimental data. Various opinions are current regarding the generic, specific, and varietal value of the characters of the lesser celandine and its immediate relatives. Some authors still maintain the genus *Ficaria* as distinct from *Ranunculus*. Relative to the British, or even to the European, species of *Ranunculus* (sensu stricto) there are arguments in favour of this, but the characters and their combinations found in a world-survey of the genus make it impossible to separate *Ficaria* from *Ranunculus*.

Within the British Isles variations in leaf-shape (the var. *decumbens* and the var. *incumbens*) and in flower colour occur, and fluctuations in the size of the plants and of the flowers are usually correlated with habitat. The occurrence of specimens in a Thames-side marsh, associated with *Caltha palustris*, *Phalaris arundinacea* and other marsh species, near Richmond, Surrey, indicates one extreme type of habitat in which the plant can flourish, since they are here flooded twice daily by high tides to a depth of a foot or more. Plants with leaves and flowers as large as those of the plant here figured occur under specially favourable conditions, but it is most unlikely that they or their offspring would show these conditions under more average habitat-conditions. In other words there is an overlapping of characters resulting from the presence of one gene-system under one set of conditions and those resulting from the presence of another under another set of conditions. The forma *luxurians* Moss (Cambridge British Flora III. 126, t. 128 ; 1920) from Jersey may be a habitat-form simulating the Mediterranean variety or race here figured as *Ranunculus Ficaria grandiflora*. Genetical experiments with the British varieties are being conducted at Kew and Potterne, but factors connected with size have not yet been the subject of experimental study. No segregates of *R. Ficaria* of more than varietal value are recognizable in the British flora.

In Europe several species have been claimed as distinct from, but closely allied to, *R. Ficaria*. Of these *R. ficarioides* Bory et Chaub. is the most definite. It is limited to certain mountains in the Peloponnese (Chelmos, Kyllene, and Taygetos), at an altitude of 1,600 to 2,000 m., to Karpathos, and, perhaps, to the Lebanon, and is remarkable for the constantly incised-lobed leaves. *R. Degenii* Herv., from Granada, Spain, is less marked but can probably be retained as a full species. *R. nudicaulis* Rouy et Fouc. (*Ficaria nudicaulis* Kerner, *F. calthifolia* Reichb., *F. pumila* Vel.) is limited to Eastern Europe and the Nearer East, and is recognized by its scape-like peduncle. The occurrence of all grades of intermediates makes it doubtful if it can be retained specifically. *R. edulis* Boiss. et Hoh., from the Elbrus mountains in North Persia, and *R. fascicularis* (C. Koch) from Transcaucasia, Armenia, Kurdistan, Iraq, and North Persia, are distinct from all European plants, but perhaps not from each other.

We are left now with the plant figured in our plate. That it has been the cause of much difference in taxonomic opinion is evident from the lengthy synonomy. Its only characteristic features are the large size of all the parts, especially the leaves and flowers. The impression is obtained from a study of living and dried material that one is here dealing with a tetraploid of the normal plant. So far as one can judge from herbarium material all grades of intermediates occur, but it is not unlikely that such an apparently continuous series is misleading and results from the overlapping of different gene-expressions under different environmental conditions as suggested above. However, it is evident from dried collections and literature that *Ranunculus Ficaria grandiflorus* is essentially a plant of countries bordering the Mediterranean Basin from Spain to Syria. The trivial *calthifolius*, whether used in specific or varietal names, has caused confusion since Reichenbach and Gussone (pro parte) applied it to different plants—the former to *R. nudicaulis* Rouy, the latter, in part, to the plant here figured. Since Gussone's description and synonyms are mixed it is legitimate as well as desirable to ignore the name *calthifolius* entirely and to use the suitable combination *Ranunculus Ficaria grandiflorus*.

The plant is easily cultivated and propagates readily by vegetative means. It is suitable for the rock-garden and can enjoy drier situations than the British varieties.

Description.—A luxuriant glabrous *herb* with rather fleshy stems and petioles, *often 2 dm. or more in height*, including the flowers. *Stems to 7 mm. in diameter*, erect, suberect, or ascending. *Leaves* relatively large and on long petioles; blades broadly ovate to orbicular, *up to 5 cm. or more in length*, usually rounded at the apex, with a more or less crenate to almost entire margin, base cordate, the lobes divergent or slightly incumbent, of a clear dark green above and paler below; *petiole up to 1·5 dm. long*, in the larger leaves strongly sheathing. *Flowers* usually on *pedicels up to 2 dm. long*, conspicuous by their size and colour. *Sepals* normally three, suborbicular, rounded at the apex, 9 *mm. long*, submembranaceous, concave, much veined. *Petals* about nine in number, ranging considerably in size and shape, usually oblong-elliptic, rounded at the apex, gradually narrowed below and without a definite claw, *about 2 cm. long*

and 1 *cm.* broad or less, bright yellow on the upper surface shining, clouded green-grey in the lower third, on the lower surface less bright yellow and often with a good deal of green ; nectary covered with a triangular scale about 1 mm. long. *Stamens* 8 mm. long. *Carpels* obliquely ovoid, 2 mm. long, hairy, especially in the lower part.

DISTRIBUTION.—Mediterranean Basin.

W. B. TURRILL.

Fig.1, aerial portion of plant, nat. size ; 2, petal, inner surface, nat. size ; 3, stamen, × 6 ; 4 to 7, carpels and achenes, probably from different sources, and, in part, doubtfully accurate.

4
3
6
7
8
5
2
1

TAB. 9200.

RHEUM PALMATUM DISSECTUM.

f. rubriflora.

Tibet.

POLYGONACEAE. Tribe RUMICEAE.

RHEUM, Linn.; *Benth. & Hook. f., Gen. Plant.* III. 100; *Dammer in Engl. & Prantl, Nat. Pflanzenf.* III. 1ª. 19.

Rheum palmatum dissectum, *Stapf* (nov. subsp.): a *R. palmato Linnaei* et *R. p. tanguticо*, Regel, foliis magis dissectis subpinnato-laciniatis, a priore praeterea inflorescentiis magis contractis robustioribus differt, interdum floribus fructibusque intense rubris gaudet.

Syn.: *R. palmatum* var., Przewalski, From Zaisan via Hami to Tibet (Russ.), 366 c. ic. (1901).

R. palmatum fl. rubro, Hort., Leichtlin in The Garden, LX. 10 c. ic. (1901); Gartenfl. L. 639 c. ic. (1901); Bull. Arboricult. Belg. 1903, p. 136.

R. palmatum var. *tanguticum*, Tschirch in Arch. Pharm. 1907, p. 682; nec Regel nec Tschirch, Handb. d. Pharmokogn. II. 1368.

R. tanguticum, Tschirch in Schweiz. Wochenschr. d. Chemie & Pharm. 1910, no. 19 et Handb. d. Pharmakogn. II. 1369, t. 55 (1914); Tafel, Meine Tibet Reise. I. 341; II. 75 (1914); non Balf. f.

R. palmatum, Hosseus in Oest. Bot. Zeitschr. LXII. 18 (1912), quoad specim. Tafel.; non Linn.

R. palmatum var. *atrosanguineum*, Hort., L. H. Bailey, Stand. Cycl. Hort. 2928 (1916).

R. purpureum, Hort., Journ. Roy. Hort. Soc. XLV. Proc. p. cvi. (1919).

In the December issue of the Botanical Magazine for 1874 a plate of *Rheum officinale* (t. 6135) was published together with an account of its discovery a few years previously and with the statement that it (and not the *R. palmatum* of Linnaeus, as was until then assumed) was the main, if not the exclusive, source of the Turkey rhubarb of the pharmacopoeas. However, whilst this article went through the press, there appeared in the October number of "Gartenflora" a communication by Eduard Regel to the effect that Przewalski had discovered *R. palmatum* in its wild state in the mountains to the east of lake Kuku Nor and that it was indeed the plant from which the true rhubarb of all the older pharmacopoeas was derived. This has since been confirmed by the researches of Hosseus and Tschirch, although, true enough, *R. officinale* was known to the Chinese long before it became a regular article of export from the Yang-tse basin and its ports and attracted the attention of European botanists and pharmacists.

R. palmatum, as Linnaeus knew it, has been in cultivation in this country and on the Continent since the middle of the 18th century. It was raised from seed obtained via Kiachta,

then, as for many years afterwards, the main depot for the rhubarb trade from China to Russia and Europe generally. It was chiefly grown for its medicinal properties and with a view to acclimatising it for commercial exploitation. The attempt was not successful and the original stock is now probably exhausted. Linnaeus received the dried specimen, from which he drew up his original description, and a rhizome, which grew into a flowering plant in the garden at Upsala, from De Gorter, Swedish ambassador at the Russian Court, with the information that they came from "ad murum Chinensem," that is no doubt the Kansu end of the Chinese Wall, through which the rhubarb trade passed on its way to Siberia. Pallas, who was in Kiachta in 1772, says that the trade was then, and had been for some time, in the hands of a Buchar family from "Selin," the present Si-ning in Kansu, and that the rhubarb grew in the high mountains near that city and also north of it in the Nan shan. Now it was exactly this region, where Przewalski collected the plant, which Regel acclaimed as the true rhubarb of medicine. It was therefore to be expected that plants produced from the seed, which Przewalski sent home and which was freely distributed, would tally with those of the earlier introduction. But botanists did not entirely agree on this point. Whilst Maximowicz, who had only dried specimens collected in an advanced state and very young plants to deal with, could see no difference, Regel, who was in the same position as to material, thought to be able to distinguish the newcomer by its more elongated and less deeply and at the same time pinnately rather than palmately divided leaves and by the more contracted inflorescences. He looked upon it as a "variety" of *R. palmatum*, which he called *tanguticum*. Professor I. Bailey Balfour, who a few years later had the advantage of being able to compare adult flowering plants raised from Przewalski's seed with examples of the old stock of *R. palmatum*, which were then still extant in the Edinburgh Botanic Garden, also pleaded for distinction, and even proposed a binome for Przewalski's plant, *R. tanguticum*, though with the qualification that this *R. tanguticum* "may be considered as a variety" of *R. palmatum*. He laid no stress on the degree of the dissection of the leaf, but relied rather on the more abundant marking of the stem with red, the marked contraction of the panicle before and after flowering and on

the shape of the area between the wings of the fruit, which was supposed to be more finely acuminate in Przewalski's plant. As I have not seen a living plant which could with certainty be accepted as a descendant of the first introduction, I would, judging from herbarium-material and the more reliable portraits of the older plant, merely point out that the original *R. palmatum* had more graceful and more open panicles and leaves, which had mostly fewer lateral lobes and therefore appeared palmately rather than pinnately lobed, and that it possessed less anthocyanine and a scantier and more minute indumentum. Whether these differences are, as it seems, merely due to fluctuation (lobing of the leaves) or to edaphic modifications, possibly brought about by cultivation (laxer inflorescence, sparsity of anthocyanine and indumentum), we cannot say without critical observation in the field. Until this is available we might maintain the distinction of a *R. palmatum Linnaei* (the nomenclatorial type or nomotype of the species) and a *R. palmatum tanguticum* (Przewalski's plant of 1872).

We are on firmer ground with regard to the plant figured in this place. Its history is as follows. When in Kansu in 1872, Przewalski ascertained that the large quantities of rhubarb, which were formerly brought to Si-ning, came from the Tatung-Edsina divide in the Nan shan, 100–120 km. northwest of the city, but that the rhubarb also grew in the snowy range to the south of Si-ning and in the "Yegrai-ula," a mountain range east of the Burkhan Budda in Tsaidam, Tibet proper. Eight years later (1880) Przewalski visited these southern districts and confirmed the information obtained in 1872, but with the qualification that the rheum he found there had leaves, which were more divided, and red flowers. He records it in the account of his third journey as growing not only in the forest-zone, but also in the lower alpine belt of the Dschahar Mountains (about 100 km. south of Si-ning), and as abundant in the valleys of the Bagagorgi and Churmen rivers, tributaries of the Hoang ho, whose sources are in the "Yegrai-Ula." In the latter locality he obtained rhizomes of extraordinary size, of which he sent samples to St. Petersburg. As he was there in April and May, it was too early to see the rheum in flower. The specimens, which he collected in an early flowering state and which were distributed as "*Rheum palmatum* Linn. ? var. ? *fl. rubro*" with the date

" 1880," must therefore have been taken on Mount Dschahar, and the same applies to an excellent sketch of the plant, drawn by Roborowski, Przewalski's companion and botanical collector, and reproduced in the explorer's Russian report. Specimens and seed of this plant, probably originating from the rhizomes, which the explorer had sent home, were distributed from St. Petersburg, and subsequently by Haage & Schmidt (Erfurt) in the late nineties of the last century as *R. palmatum fl. rubro.* The Glasnevin Botanic Gardens obtained some of the seed, and from it was raised the stock, which supplied the model for our plate. Leichtlin published a good photographic print showing the elegant habit of the plant in "The Garden" of 1901, whilst a still better picture of it may be found in the "Jahrbuch für Staudenkunde" for 1913. Here Professor Udo Dammer tells us that he saw it first in the Botanic Garden of St. Petersburg in 1896, when it struck him by its noble deeply segmented foliage and the brilliancy of its deep crimson flowers and fruits. He proposed for it the name *R. palmatum tanguticum purpureum*, which in gardens was eventually replaced by *R. palmatum* var. *atrosanguineum* or abbreviated to *R. purpureum.* A later introduction of the plant is due to Dr. Albert Tafel, who in 1906 sent seed of it to Professor A. Tschirch of Bern. He collected them in the neighbourhood of Dulan Gombo, a Tibetan monastery to the west of Kuku Nor (37° N. by 98° 40′ E.), but he met with it also further south on the northern slopes of Burkhan Budda above the valley of the Yegrai-Gol, that is to the west of the "Yegrai-Ula" of Przewalski. The plants raised by Tschirch from these seeds exactly tally with Przewalski's except in so far that the flowers were in some rare cases not red, but yellowish. A photographic print, published in the Professor's "Handbuch der Pharmakognosie" is almost a replica of Dammer's picture. Tafel in "Meine Tibet Reise" says that the plant flowered in the beginning of July. The leaves formed bush-like masses over 6 dm. high which covered several square meters, with the flowering stems rising through them to 2 and even 3 m. The leaf-blades were deeply cut into large acuminate lobes and borne on red-streaked stalks and the flowers were reddish white. The plant grew among shrubs and on limestone rocks, preferring the more humid parts of the woods, but it also occurred occasionally in wet spots on sandstone slopes. Its

vertical range was from 2800–4100 m. Near Dulan Gombo it was abundant and almost every year it attracted Mahommedan dealers who collected the rhizomes and sent them to Danka (Tun hwang on the Danga gol ?), Su-chou and Si-ning. Tschirch was so impressed by the peculiar foliage and general habit of the plant that he described it as a distinct species, *R. tanguticum* Tschirch, a name which is hardly admissible, as it is liable to be confused with Balfour's identical binome for Regel's earlier var. *tanguticum* of *R. palmatum*, which Tschirch retains. The colour of the flowers and fruits is evidently not uniform in the field, although there may be constant colour strains, whilst the dissection of the leaves, striking as it is, particularly in Tschirch's picture, is of the same type as in Przewalski's earlier collecting, only more accentuated. For this reason and as there is moreover no difference in the structure of the panicle and of the individual flowers, I would propose to treat our plant as a rather marked member of a complex of closely related forms. This complex may be designated as *R. palmatum* and our form as *R. palmatum dissectum*.

I have already observed that the cultivation of *R. palmatum* for medicinal purposes was urged long ago. It was again recommended, when fresh seed collected by Przewalski and Tafel came to hand. It does not seem to have proved successful as a commercial venture ; but there is no reason, why its finest forms, like the one figured here, should not become a permanent ornament of parks or gardens, where they would be a striking feature on deep loamy soil with a background of trees for contrast and shade.

The history of *R. palmatum* as a valued drug and article of trade covers well nigh on two thousand years. Fascinating as it is, we can in this place only point to the very interesting abstract, which Professor Tschirch has given of it in his " Handbuch."

Description.—A perennial *herb* with a large fascicled tuberous rhizome. *Leaves* collected into large basal tufts and, a few smaller ones, scattered on the flowering stems ; blades orbicular to somewhat elongated from a cordate base, *deeply and doubly lobed*, up to 5 dm. in diameter, *with two basal and two or three lateral primary nerves to which as many primary lobes correspond, these and the terminal lobe lobed*

again or the uppermost entire, primary and secondary lobes acutely acuminate from a triangular base, loosely covered with minute papillae on the face, puberulous or almost bristly on the midrib and main nerves, dark green, sometimes suffused with purple ; stalks stout, those of the lower leaves up to over 1·5 dm. long, of the upper much shorter to very short, coarsely puberulous, streaked with red ; stipules (ochreae) large, membranous, reddish, papillosely puberulous, of the cauline leaves up to over 6 cm. long. *Flowering stems* up to 2·5, rarely to 3 m. high, divided from the lower third upwards into a narrow, downwards leafy compound panicle, *whose branches are up to flowering, and again after flowering, erect and contracted around the rhachis*, but spread obliquely during flowering, *all its axes more or less papillose or puberulous ;* pedicels filiform, about 4 mm. long, articulate below the middle, thickened upwards. *Perigone-segments* obovate-oblong, the inner about 2 mm. long, the outer shorter, *reddish-white to deep crimson*, recurved after flowering. *Filaments* 2 to 3 mm. long, *pale to crimson* ; anthers 1 mm. long, *crimson*. *Styles* short ; stigmas transversally capitate. *Fruit* up to 1 cm. long ; wings up to 2 mm. wide, interalar spaces oblong-elliptic acuminate ; the whole fruit turning red to deep crimson.

Distribution.—Central Asia ; Kansu and the adjoining parts of Tibet, around Kuku Nor.

O.S.

Fig. 1, half a lower leaf, × ¼ ; 2, part of inflorescence, nat. size ; 3, flower, × 6 ; 4, a young fruit, × 6 ; 5, a stamen, × 9 ; 6, ovary, × 6 ; 7, a fruit, × 2·5 ; 8, a young fruit with a tubercle on one of the interalar spaces, nat. size.

TAB. 9201.

ABIES FABERI

et

ABIES FORRESTII.

China.

PINACEAE. Tribe ABIETOIDEAE.

ABIES, A. Dietr.; *Benth. & Hook. f., Gen. Plant.* III. 441; *Eichler in Engl. & Prantl, Nat. Pflanzenf.* II. 1. 81; *Pilger in Engl. Nat. Pflanzenf. Ed.* 2, XIII. 312.

Abies Faberi, *Craib in Not. Bot. Gard. Edinb.* XI. 278 (1920); arcte affinis *A. Delavayi*, Franch., et *A. Forrestii*, Craib, sed ab utraque differt ramulis fuscis vel luteo-fuscis ob foliorum pulvillos prominentes exaratis, foliorum apicibus sensim rotundatis minus emarginatis vel integris, ab *A. Delavayi* praeterea foliis firmioribus ad margines multo minus revolutis, stomatiferis vittis plane expositis.

Syn.: *A. Fargesii*, Masters in Gard. Chron. Ser. 3, XXXIX. 213, fig. 183 (1906) et in Journ. Linn. Soc. XXXVII. 422 (1906); non Franch.

A. Delavayi, Masters in Journ. Linn. Soc. XXVI. 557; Dallimore & A. B. Jackson, Handb. Conif. 97 (1923); Rehder & Wils. in Sargent, Pl. Wilson. II. 41 (1914); Wilson, Veg. West China (Publ. Arn. Arb. No. 2), t. 94–100 (1911) et Arn. Arb. Exped. China, 1910–11, t. 0346 (1912) et Naturalist West China, I. 225, 234, 247, 250 c. ic., p. 238, 242; II. 19 (1913) et China, Mother of Gardens, 245, 248, 272 (1929); non Franch.

Keteleeria Faberi (*Fabri*), Masters in Journ. Linn. Soc. XXVI. 555 (1902); et XXXVII. 421 (1906) et in Gard. Chron. Ser. 3, XXXIII. 194 (1903); Mottet in Rev. Hort. 1904, p. 130; Beissner, Handb. Nadelholzk. Ed. 2, p. 203 (1909); Patschke in Engl. Bot. Jahrb. XLVIII. 649 (1913).

Pinus Fabri, Voss in Putlitz & Meyer, Landlexikon, IV. 773 (1913).

A. Forrestii, *Craib in Not. Bot. Gard. Edinb.* XI. 279 (1920); ab *A. Faberi* ramulis sublaevibus ferrugineis vel cinnamomeis, gemmis copiose resinosis, foliis potius firmioribus planioribus ad margines crassioribus apice saepe brevissime rotundatis vel subtruncatis plane emarginatis, conis, ut videtur, minus crassis diversa.—Dallimore & A. B. Jackson, Handb. Conif. 101 (1923); C. C. Rogers in Gard. Chron. Ser. 3, LXXX. 427, fig. 191 (1926).

Syn.; *A. Delavayi*, Forrest in Journ. Roy. Hort. Soc. XLI. 206 (1915); XLII. 42 (1916).

Abies Faberi has a very mixed history. It was originally described as *Keteleeria Faberi* by Masters from a specimen (no. 984) collected by Dr. Ernst Faber, of the Rhenish Missionary Society, on Mt. Omei in Szechuan in 1887. Then, in 1903, Wilson obtained it for Messrs. Veitch on Wa-shan (S.W. of Mt. Omei). The herbarium specimens of this collecting were numbered 3021 and 3022, the seed sample 1515; but as the number 3021 was accidentally duplicated (appearing again under *Abies recurvata*), Wilson corrected it to "3020 = 3022" in Hb. Veitch, adding at the same time an "a" to the original no. 3022. When, writing in the Gardeners' Chronicle on "Chinese Conifers," in 1906, Masters

referred no. 3022a (quoted as 3022A) to *A. Delavayi*; but he also included now Faber's silver-fir from Mt. Omei in this species, thereby tacitly reducing his *Keteleeria Faberi* to *Abies*. On the other hand, he identified in the same place Wilson's 3022 (without an "a") with *A. Fargesii*. Franch., a very different plant from the frontier of north-eastern Szechuan and Shensi. Masters illustrated both species, *A. Delavayi* as he conceived it, by a combination of figures, drawn partly from Franchet's original from Tali (leaves) and partly from Wilson's 3022a (cones, scales and seeds), and *A. Fargesii* drawn from Wilson's 3022 (the corrected 3021). When, in 1914, Rehder and Wilson published their account of *Abies* in "Plantae Wilsonianae", they followed Masters in identifying the *A. Delavayi* of Tali with the Wa-shan and Omei plants quoted by him, but they also added, *A. Fargesii* of Masters (not of Franchet) as a synonym to *A. Delavayi*. A further element of confusion was introduced, when a few years later seed of an *Abies* collected by Forrest (no. 6744) in the Likiang range in 1910, and plants grown from it were distributed under the name of *A. Delavayi*. There were now two "*Abies Delavayi*" in cultivation, Wilson's from Wa-shan, raised in Messrs. Veitch's nursery at Combe Wood (seed no. 1515) and Forrest's from Likiang (Bees' Exped. 6744). Eventually doubts having arisen about the identity of the plants so obtained, Professor W. G. Craib, then Lecturer on Forest Botany in the University at Edinburgh, subjected the material concerned to a careful examination, with the result that at that time (1919) the name *Abies Delavayi* was shown to cover three distinct plants: (1) the original *A. Delavayi* of Franchet from Tali; (2) Faber's and Wilson's Omei and Wa-shan plants; and (3) Forrest's plant from the Likiang range. Retaining the name *A. Delavayi* for the silver-fir from Tali, he designated the other two as *A. Faberi* and *A. Forrestii* respectively. Dealing with a larger material than was at Craib's disposal, I have come to the same conclusion.

A. Delavayi, in the original and restricted sense of the term, has, outside the Tali range, been collected by Forrest in the Shweli-Salween divide in 25° 20′ to 25° 40′ N.L. at about 3000 m., where it forms pure forest or associates with other conifers. It is readily distinguished from *A. Faberi* and *A. Forrestii* by its leaves, whose margins become early and

persistently revolute, so that for the greater part of their length they are mostly contiguous with the midrib or with each other over the midrib. It approaches *A. Forrestii* in the rather smooth bark of the young branches, a condition due to the obscure development of "leaf-cushions"; but the branches appear to be quite glabrous from the beginning, and not rusty-pubescent as in *A. Forrestii*, and their colour is a darker and duller brown.

Both *A. Faberi* and *A. Forrestii* have, compared with *A. Delavayi*, flatter and thicker leaves, whose margins are only narrowly recurved, so that the stomata-bearing sides of the back are fully exposed. The transverse curvature is, however, at least in old or dry leaves, generally more pronounced in *A. Faberi* than in *A. Forrestii*, so that the leaves often appear two-channelled between the margins, the midrib forming the dividing ridge between the channels. The tips of *A. Faberi* are also less distinctly or quite obscurely notched, the margins more acute and the backs mostly less white or almost green between the margins and the midrib. Another and conspicuous difference is in the young branches, which are yellowish to brown in *A. Faberi* and not reddish as in *A. Forrestii*, whilst at the same time the leaf-cushions are markedly developed with deep grooves between them. Craib observes that the course, which the leaves assume on the horizontal branches by the twisting of the stalks, is different in the two species, those of *A. Forrestii* turning so that their very white underside becomes very conspicuous if seen at some distance. Whilst this is so in many cases and undoubtedly adds to the beauty of the plant, illumination and position on the tree and other variable factors play too great a part in the turning of the leaves to render this character dependable. In fact, in *A. Forrestii* all the leaves of a branch may be placed almost horizontally, when the underside is visible only from below. A further vegetative character which separates *A. Faberi* and *A. Forrestii* is in the resinous coating of the buds. This is moderate in *A. Faberi*, but so copious in *A. Forrestii* that the buds often appear immersed in a lump of resin. There seems to be no tangible difference in the male strobiles and probably little in the female. To judge from Wilson's photograph (No. 0346) and specimens, the cones of *A. Faberi* seem to be rather stouter than those of *A. Forrestii*, but the

material available for comparison is so scanty that no definite conclusions can be drawn from it. Wilson describes the silver-fir of Mt. Omei as a handsome tree, which "right royally does . . . deserve the sceptre". It appears there already at 1800 m., but attains to its full size between 2550 and 3000 m. In this belt hundreds of trees may be found from 25 to 30 and even 40 m. high with a girth of 3–3·5 m. Excellent photographs of trees of varying age may be seen in Wilson's "Vegetation of Western China", tt. 94–100. Young plants resemble the early stage of *A. Forrestii*, as pictured by Professor Craib in "Notes from the R. Botanic Garden at Edinburgh" (vol. XI). In later stages the tiers of the widely spreading branches stand far apart, the crown becoming elegantly and broadly pyramidal and at length more and more oblong with the top often ultimately rising as a denuded and battered spire from the main body. The timber, although soft and not very durable, is much used in house building.

The area of *A. Faberi*, as far as ascertained, includes all the higher mountain ranges between the Tung ho and the Min river to about 30° N.L. Wilson also records it from Wenchuan Hsien (31° 30′ N.), but the specimen I have seen from this locality (no. 4049) has smaller cones with much smaller seeds and may represent another species. *A. Forrestii* appears to be confined to the Likiang range, where Forrest discovered it in 1910, and to the mountains in the southernmost corner of Szechuan (Yenyuen and Ningyuen districts), where C. K. Schneider and Handel-Mazzetti collected it in 1914. It too forms occasionally whole forests. Handel-Mazzetti's pictures (figs. 31 and 37) show it as a tree with an oblong, upwards tapering and rather dense dark-green crown. According to the Austrian travellers it attains up to 20 m. in height, but Forrest saw trees still higher (24 m.).

The material for the figures of *A. Faberi* was kindly supplied by the Marquis of Headfort out of his splendid collection of Chinese conifers, that of *A. Forrestii* by Mr. P. D. Williams of St. Keverne, Cornwall. As the cones of *A. Faberi* did not ripen, I felt justified in supplementing the plate by the addition of a coning branch of *A. Forrestii* so that at least the general type of the group might be represented.

Description.—1. **Abies Faberi.** A tall tree up to 40 m. high, 2·5–5 m. in girth ; *young branches* minutely pubescent, soon glabrescent, *yellowish-to-dark brown; leaf-cushions sharply marked off*, bark firm. *Vegetative buds* ellipsoid-ovoid, the terminal up to over 1 cm. long, *slightly resinous. Leaves* very close, the outer (of spreading branches) horizontal, the inner and upper assurgent, rather straight, or all more or less horizontal, linear, *rounded, rarely, subtruncate and minutely or obscurely notched at the tips*, mostly between 1·5 and 2·25 cm. by 2 (rarely 2·5) mm. ; margins moderately stout, distinctly recurved, midrib prominent, back white to almost green between the margins and the midrib and owing to the transverse curvature of the leaf more or less flatly channelled, with 9–11 rows of stomata. *Male strobiles* 1·5–3 cm. by 6 mm., shortly stalked. *Female strobiles* oblong, dark purplish-blue ; bracts rotundate-obovate to rhombic, erosulate, 5–6 mm. long, suddenly contracted into a recurved awnlike appendage, 3 mm. long. *Ovuliferous scale* transversally elliptic, as shown in fig. 7. *Mature cone* shortly cylindrical, very slightly wider towards the base with a rounded top, 6–8 cm. by 3·5–4·5 cm., dark blue or bluish-black ; bracts spatulate, as long as the covered part of the scale, their recurved appendages exserted or at length breaking away. *Scales* transversely elliptic, clawed, the larger (of the lower half of the cone) about 1·5–1·7 cm. by 2·2–2·4 cm., reddish-brown, except their exposed dark tops ; these rather depressed, 3–4 mm. by 1·5 cm., claw 5–6 mm. long. *Seed* oblong, slightly wider upwards with an oblique narrow minutely erosulate or crisped crest, 7–9 mm. long, up to over 2·5 mm. wide, pale brown ; wing obliquely-obovate, truncate, the part exceeding the seed almost square, 9–10 mm. by 9 mm., fuscous, darker on the adaxial side and dark chestnut brown and polished, where it covers the seed.

Distribution.—China. Western Central Szechuan.

Description.—2. **A. Forrestii.** A tall tree up to over 20 m. high ; *young branches* rusty pubescent, glabrescent, *dark reddish-brown* ; *leaf-cushions obsolete* ; bark firm. *Vegetative buds* shortly ovoid, blunt, up to 8 mm. long, mostly *thickly coated with resin. Leaves* similar to those of *A. Faberi, but* slightly *firmer and flatter, with the tips shortly*

rounded to almost truncate and distinctly notched and the *margins rather stout, mostly strikingly white on the back*; stomata in about 13 rows. *Male strobiles* as in *A. Faberi*. *Female strobile* as in *A. Faberi*. *Cone* (not quite mature) as in *A. Faberi*, but *more cylindrical and slenderer, up to* 9 *cm. by* 3·25 *cm.*

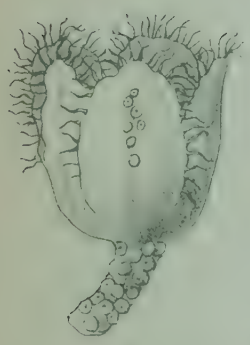
DISTRIBUTION.—China, Yunnan, Likiang range; Szechuan, extreme southern corner.

O.S.

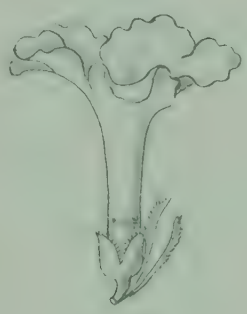
A. Faberi. Fig. 1, male branch, nat. size; 2, a leaf and catkin with supporting perules, × 3; 3, an anther dehisced, × 15; 4, a female branch, with a strobile, nat. size; 5, a portion of the surface of the strobile, × 3; 6, a bract in dorsal view, × 6; 7, the same in face-view with ovuliferous scale, × 6; 9, cross-section of leaf.

A. Forrestii, Fig. 8, cone-bearing branch, nat. size.

1



5



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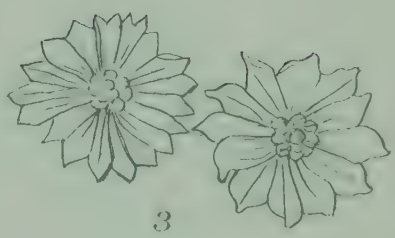

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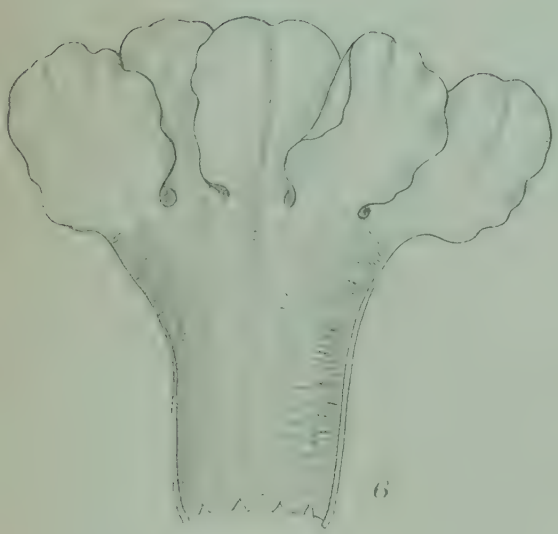
7



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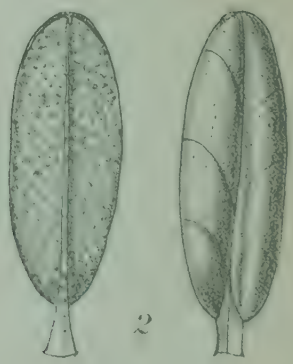
8



2

L. Snelling del et lith.

Tab. 9202.

RHODODENDRON HEDYOSMUM.

China.

Ericaceae. Tribe Rhododendreae.
Rhododendron, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 599; *Drude in Engl. & Prantl, Nat. Pflanzenf.* IV. 1. 35.

Rhododendron hedyosmum, *I. B. Balf. in Not. Bot. Gard. Edinb.* IX. 234, 316 (1916); arcte affine *Rh. cephalantho*, Franch., et *Rh. Sargentiano*, Rehd. & Wils. (vide Bot. Mag. t. 8871), ab utroque vero differt perulis mox deciduis, a posteriore etiam foliis floribusque paulo maioribus atque corollis albis.—Millais, Rhododendrons, Ser. I. 184 (1917); Ser. II. 153 (1924).

R. hedyosmum belongs to a group of dwarf rhododendrons for which Sir I. Bailey Balfour proposed the name *Cephalanthum*-series. Their close affinity to the *Anthopogon*-series is obvious, as may be seen by comparing our plate with that of *R. anthopogon* on t. 3947 of this Magazine, and it may be doubted whether the distinction is maintainable on morphological grounds, although some support for it may be found in their geographical distribution, the *Cephalanthum*-series being West-Chinese (from Kansu to the Yunnan-Burma frontier), and the *Anthopogon*-series Himalayan. Balfour enumerates 14 species as belonging to the *Cephalanthum*-series. Among these our plant most resembles *R. cephalanthum*, a species of the Tali range and its northern continuation as far as Lankong, almost the only difference being in the shape and persistence of the perules, which adhere to the annual growths into the second year and thereby become a marked feature. The same applies to *R. Sargentianum*, a native of Western Szechuan (Wa shan and Mupin), but this has at the same time somewhat smaller leaves and whitish or pale yellow flowers with a coating of scales on the outside of the corolla. It was in a sowing of this species (Wilson, no. 1208 from Mupin) that *R. hedyosmum* appeared in the Royal Botanic Garden at Edinburgh in 1909. It flowered and fruited there for the first time in 1916 and produced the seed from which the plant represented in this place was grown by Mr. E. J. P. Magor of Lamellen, St. Tudy, Cornwall. I may observe in this place that a rhododendron intermediate in foliage between *R. cephalanthum* and *R. Sargentianum*, with corollas white and scaleless as in the former but of the size of those of the latter, and with very few perules on the old wood, was

collected by Wilson on the Ta-pao shan, about 35 km. north of Tatsien lu. Rehder and Wilson enumerate it as *R. cephalanthum*. To my mind it deserves further observation.

Description.—A low growing small *shrub* up to 3 dm. high; branches covered with stipate peltate scales and bristles (the persistent stipes of broken-up scales). Vegetative buds small, ovoid, acute; *perules* ovate-oblong, acute to mucronate, scaly, ciliate, *early deciduous*. Leaf-blades oblong from a subacute to obtuse base, rounded and sometimes slightly notched at the tip with a small hard mucro, *2–3·5 cm. long by 0·7–1·2 cm.*, coriaceous, face dark green, smooth and shining with vestiges of scattered scales, minutely rugose when dry, back dull rusty-brown, with a close scurfy covering of two layers of peltate denticulate scales, margin slightly revolute; midrib impressed above, prominent below, lateral nerves very obscure; petioles stout, those of the lower leaves of a year's growth 5–7 mm. long, upper much shorter, slightly channelled. *Flowers* up to over 10 in a small terminal head, up to 4·5 cm. across; bracts broad ovate or obovate, acute or acuminate, 0·8–1 cm. long by 4–5 mm. broad, pubescent and scaly without, pubescent within, more or less ciliate; bracteoles linear-clavate, up to 12 mm. long, scaly and pubescent on the back, pubescent on the face, woolly-ciliate; pedicels 3–5 mm. long, scaly. *Calyx* green, cup-shaped, divided almost to the base, lobes lanceolate to ovate, subacute to rounded, sparingly scaly without, otherwise smooth, fringed with woolly hairs, smooth within. *Corolla* tubular-campanulate, *white, 2·5 cm. across*; tube narrow, cylindrical *for 1·2–1·5 mm.* then slightly and shortly funnel-shaped, limb 5-lobed, lobes broad-elliptic, 0·8–1 cm. long by 6–8 mm. across. *Stamens* 5, filaments 5–6 mm. long, slender with a swollen base, glabrous; anthers 2 mm. long. *Ovary* broadly-ovoid, 5-lobed, scaly, 2 mm. high and almost as broad, green; style almost as long as the ovary, stout, clavate, smooth; stigma disciform, 5-lobed.

Distribution.—China; Western Szechuan.

O.S.

Fig. 1, flowering branch, nat. size; 2, leaf in front and back view, nat. size; 3, scales from the underside of a leaf, × 50; 4, flower with bracteoles, nat. size; 5, calyx, × 4; 6, corolla, cut open, × 2; 7, stamen, × 5; 8, gynoecium, × 7.

L. Snelling del et lith.

Tab. 9203.

COLUMNEA MICROPHYLLA.

Costa Rica.

GESNERIACEAE. Tribe COLUMNEAE.

COLUMNEA, Linn.; *Benth. & Hook. f., Gen. Plant.* II. 1009; *Fritsch in Engl. & Prantl, Nat. Pflanzenf.* IV. 3 b. 169.

Columnea microphylla, *Klotzsch & Hanst. ex Örsted, Centralamer. Gesnerac.* 63, t. II, fig. 24 (1858); et *in Danske Vidensk. Selsk. Skrift.*, Scr. 5, V. 137 (1861); affinis *C. Oerstedianae,* Klotzsch, a qua foliis minoribus supra conspicue pilosis, calycis segmentis ovatis superne recurvis haud acuminatis recedit.—Hanstein in Linnaea, XXXIV. 407 (1865–66); Donnell Smith in Pittier, Primit. Fl. Costaric. II. fasc. 2, p. 192 (1898); F. W. Jeffery in Gard. Chron. Ser. 3, LXXVII. 267 (1925); Journ. Roy. Hort. Soc. LII. Proc., p. liv (1927).

The forest flora of Costa Rica is characterized by a wealth of epiphytic vegetation, among which the *Gesneriaceae* are conspicuous by the beauty of their vividly or delicately coloured flowers, sixteen genera and sixty-six species of this family alone being enumerated by Donnell Smith from that country (l.c. 182–200). Much the largest genus is *Columnea* with over twenty species recorded from Costa Rica, which is one of its chief centres of distribution. Nine species of *Columnea* have previously been figured in the Botanical Magazine, including *C. rotundifolia* Salisb. (t. 1614), which appeared as "*C. scandens* Sw.", the true *C. scandens* being represented subsequently in t. 5118. Apart from *C. microcalyx* Hanst., which does not appear to be in cultivation, the closest ally of *C. microphylla* seems to be *C. Oerstediana* Klotzsch (t. 8344), while other related species are *C. magnifica* Klotzsch et Hanst. (t. 8225), *C. gloriosa* Sprague (t. 8378), and *C. glabra* Örst. (t. 8453), all of these being natives of Costa Rica. These last four plates, in conjunction with the present one, illustrate some of the best specific characters in the genus, namely, the habit, whether shrubby or herbaceous, and the form, nervation, texture and indumentum of the leaves and calyx.

The identification of the plant here figured with *C. microphylla* rests on comparison with Örsted's description and figure and with Hanstein's description, since authenticated material of the species is not available for examination. Certain discrepancies which have been noted are probably due to the fact that the species was originally described from dried specimens. In the cultivated plant the leaves are

distinctly petioled, the calyx-lobes are recurved, the corolla is much wider, with more pronounced lateral lobes of the upper lip, and the filaments are papillate below, all these characters being more or less at variance with the original descriptions and figure. Comparison of cultivated specimens of *C. Oerstediana* (t. 8344), however, with the original figure of that species (Örsted, l.c. t. 8) reveals somewhat similar differences, so that the discrepancies noted above may perhaps be disregarded.

Description.—An epiphytic *herb*, slightly fruticose at the base, giving off numerous trailing stems and branches which root here and there at the nodes; branches *shortly hirsute with acute purplish several-celled spreading hairs*. *Leaves* really opposite and decussate, but owing to curvature of their petioles arranged dorsiventrally in two rows, *broadly ovate* or subelliptic, *very convex with recurved obtuse apex* and subcordate or subtruncate base, inconspicuously crenate in their upper half or third, 0·8–1·3 cm. long, 0·5–0·9 cm. broad, stiffly and *shortly-hirsute* with purplish ascending hairs *on the upper surface*, sparingly hirsute on the lower, *midrib deeply impressed on the upper surface*, slightly raised on the lower, lateral nerves about two on each side of the midrib, ascending, visible only on the lower surface; petioles 1·5–4 mm. long, hirsute with spreading or ascending hairs. *Flowers* solitary, axillary; peduncles about 1 cm. long or more, villous-pilose with spreading hairs. *Sepals* ovate, *strongly recurved*, *serrate*, about 1 cm. long, villous-pilose on both surfaces. *Corolla* about 8 cm. long, very pilose outside, strongly bilabiate, tube orange in front, scarlet at the back, limb mainly scarlet; base of the tube gibbous at the back; lower lip horizontal or slightly ascending, strap-shaped, 2–3 cm. long; upper lip 4–5 cm. long, 4-lobed, 2 lateral lobes obliquely deltoid, 2 posterior lobes semicircular. *Stamens* 4, didynamous, united in pairs by the apices of their anthers; filaments united at the base into a sheath about as long as the ovary; filaments papillate below. *Nectary* solitary, posterior, oblong, entire, about half as long as the ovary or less. *Ovary* ovoid, densely villous.

Distribution.—Endemic in Costa Rica.

T. A. Sprague.

Fig. 1, a flowering branch, nat. size; 2, node with leaf, showing upper surface, × 4; 3, longitudinal section of base of flower, showing the staminal sheath, nectary and ovary, × 3; 4, stamens, × 2; 5, back of anther, showing attachment and connective, × 4; 6, ovary and nectary, × 5; 7, nectary, × 5; 8, 9, stigmas, × 5.

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Tab. 9204.

EPHEDRA PROCERA.

Orient.

Ephedraceae.

Ephedra, Linn.; *Benth. & Hook. f., Gen. Plant.* III. 418; *Eichler in Engl. & Prantl, Nat. Pflanzenf.* II. 1. 117; *Stapf, Art. Gatt. Ephedra in Denkschr. Akad. Wiss. Wien*, LVI. (1889); *Markgraf in Engl. Nat. Pflanzenf.* Ed. 2, XIII, 418.

Ephedra procera, *Fisch. & Mey., Index X. Hort. Bot. Petrop.* 45 (1844); arcte affinis *E. maiori*, Host. (*E. nebrodensi*, Tin.), sed ramis laevissimis laxius sulcatis, galbulis semimaturis angustioribus magis elongatis, seminibus elongato-ovoideis distincta.—C. A. Meyer, Versuch Monogr. Ephedra (Mém. Sc. Nat. Acad. Sc. Pétersb. V. 91 (1846) et Verz. Kolenati Caucas. Pfl. (Beitr. z. Pflanzenk. Russ. Reich. VI.) 11 (1849); Endlicher, Syn. Conif. 262 (1847); Ledebour, Fl. Ross. III. 664 (1851); Carrière, Traité Gen. Conif. 559 (1853); Ed. 2, p. 776 (1867); Tchichatcheff, Asie Min. II. 501 (1860); Parlatore in DC. Prodr. XVI. II. 358 (1868); Owarin in Bull. Soc. Nat. Mosc. XLIX. No. 2, p. 201 (1875); Stapf in Denkschr. Akad. Wiss. Wien, L. 2 (1885); Medwedjew, Der. i. Kustar. Kavkasa (Trees & Shrubs Caucas.), Gymnosp. 48, c. ic. (1905); Gartenwelt, XXII. 276, c. ic. (1918).

Syn.: *E. monostachya*, C. A. Meyer, Verz. Pfl. Cauc. Casp. 40 (1831), non Linn.
E. graeca, C. A. Meyer, Versuch Monogr. Ephedra (Mém. Sc. Nat. Acad. Sc. Pétersb. V.) 93 (1846).
E. vulgaris, Boissier & Buhse, Aufzähl. Transkauk. u. Pers. Pfl. 204 (1860); non Rich.
E. nebrodensis var. *procera*, Stapf, Art. Gatt. Ephedra (Denkschr. Akad. Wiss. Wien, LVI.) 80 (1889); Beissner, Handb. Nadelholzk Ed. 2,637 (1909); Fedtschenko & Fler., Fl. Sibir. II. 85, fig. 99 (1909); Pearson, Gnetales (cur. post.) 2, t.1 (1929).
E. maior, Bornmüller in Bull. Herb. Boiss. Ser. 2, VIII. 830 (1908), non Host.
E. maior β procera, Bornmüller in Beih. Bot. Centralbl. XXVI. II. 439 (1910); XXVIII. II. 522 (1911); XXXIII. II. 322 (1915).

The present plate was prepared from specimens obtained in 1922 and 1926 from an old clump of *Ephedra*, named *E. nebrodensis* in the Botanic Garden at Cambridge, a photograph of which may be seen in the late Professor Pearson's recently published "Gnetales." The group measures about 5–5·5 m. through along its longer axis and rises in the centre to up to over 2 m. It is a dense mass of slender, stiff, erect, perfectly smooth and somewhat glaucous twigs, which in some years bear an abundance of succulent fruits of a peculiar red that is slightly dulled by a faint bloom. *E. procera* shares its rigid and yet graceful habit, by which it is easily distinguished from the more familiar *E. distachya*, with its sister-species *E. maior** and *E. equisetina*. This

* The name *E. maior* is used here for the species commonly called *E. nebrodensis*. It was fully and clearly described from Dalmatian specimens by Host (Fl. Austr. ii. 671) in 1831, whilst Tineo's trivial *nebrodensis* (in Gussone, Fl. Sic. II., p. ii and 637) dates from 1844. This was taken over from Cupani's *Equisetum nebrodense*

small group of three species ranges from the Canaries through the Mediterranean region and Central Asia to North China, *E. maior* occupying the western section of the group-area (Canaries to Tunis and Spain to Dalmatia, isolated localities in the Balkan Peninsula and in northwestern Asia Minor), and *E. equisetina* the eastern (Turkestan to China), whilst *E. procera* fills the gap between them (Greece, most of Asia Minor, Armenia, Transcaucasia, the Caucasus and the less arid mountain-ranges of Iran as far as the Hindukush). The areas of *E. maior* and *E. procera* seem to overlap only slightly in northwestern Asia Minor and those of *E. procera* and *E. equisetina* in Turkestan.** Morphologically *E. maior* and *E. procera* differ mainly in the cortex of the twigs and the shape of the immature fruits and the mature seeds, the twigs of *E. maior* being mostly more closely and finely ribbed and studded with minute warts, whilst the ribs of *E. procera* are more distant and altogether devoid of warts. They are also on the whole more glaucous. The ripe seed of *E. maior* might be described as ovate in outline, that of *E. procera* as elongate-ovate. This difference in the shape of the seed also finds expression in the shape of the galbule or female cone up to the time of complete maturation, when the bracts become fleshy and bulging and distort it. *E. equisetina*, which very closely resembles *E. procera*, is best recognised by the high degree of union of the inner bracts of the galbule. Under natural conditions *E. procera* mostly grows to a height of 1·5 m., but occasionally it exceeds 2 m. The colour of its twigs varies from a bright or dull green to a decided glaucous-green; more rarely they are yellowish green. C. A. Meyer distinguished two varieties, *chrysocarpa* and *erythrocarpa*, the first with yellow, the second with orange-red fruits; but Medwedjew has already pointed out that these differences are very slight and inconstant, although red fruits are mostly found on individuals with glaucous twigs and yellow fruits on such

(1696). In my monograph of *Ephedra* I treated Tineo's *E. nebrodensis* and C. A. Meyer's *E. procera* as varieties of a more widely conceived *E. nebrodensis*, whilst I attribute specific rank to each of them in this place. It is largely an academic question whether we should do one or the other; but from a practical standpoint, it will be better in this case to take the narrower view of the species. If the wider concept is upheld the question of also including *E. equisetina* will have to be considered.

** The material of the Turkestan ephedras referred to (*E. nebrodensis* and *E. equisetina*) is, as far as I have seen it, mostly without female cones and altogether scanty.

with bright green twigs. *E. procera* is locally common throughout the Caucasus and Transcaucasia and evidently widely spread through the mountain ranges on the borders of the highland of Iran, but it appears to be absent from the drier centre. It is to be found on all the mountains in the neighbourhood of Shiras up to over 2,800 m., occurring mostly in small widely scattered colonies, but it is sometimes so abundant as to become a feature in the scenery, as on Kuh-i-Barf, where its sea-green bushes produce a colour-effect that is not without a certain beauty. The vertical range of the species is very wide, from a few hundred metres above sea-level to 2,700 m. (Caucasus) or to 3,400 m. (Kerman).

Ephedra procera should be perfectly hardy in these islands, except the wetter west. Its tall, erect, and, in spite of stiffness, rather graceful growth, combined with the rich colour of the twigs, renders it preferable to the more commonly grown low species of *Ephedra*, which often assume an untidy appearance. As the plant is dioecious, both sexes will have to be grown together to ensure fruiting.

Description.—An erect arborescent dioecious *shrub*, mostly 1–1·5 m. (sometimes over 2 m.) high, rarely shortly prostrate, with stiffly ascending branches; green twigs opposite, fascicled or in false whorls, stiff, very slender, terete, *finely ribbed*, *quite smooth*, mostly more or less glaucous, internodes 0·7–2 cm. long, 1–1·5 mm. in diameter, rarely stouter; old bark grey, splitting longitudinally. *Leaves* opposite, reduced to brown scarious triangular scales up to 3 mm. long, those of a pair united by a whitish membrane up to or beyond two thirds of their length into a sheath, which finally breaks up. *Male strobili* sessile, solitary or in clusters of 2 or 3, rarely more, 4–8-flowered, subglobose, 4–5 mm. long; bracts rotundate-ovate, obtuse, united up to $\frac{1}{3}$ of their length, 1·5–2 mm. long. *Perianth* utriculiform, deeply and transversely 2-lobed. *Staminal-column* shortly or indistinctly exserted; anthers 6–8, sessile. *Female strobili* (galbuli) very shortly stalked or sessile, *elongate-ovoid;* bracts in 2 pairs, the outer pair about 2 mm. long, united up to $\frac{1}{3}$, *the inner* twice as long or slightly longer, *united up to* $\frac{1}{3}$–$\frac{1}{2}$, obtuse, more rarely the bracts in 3 pairs, with the lowest very short. *Ovule* oblong, obscurely quadrangular. *Tubillus* straight, exserted.

Mature fruit globose-ovoid to globose-ellipsoid, up to 1 cm. long, red, rarely yellow, bracts very fleshy, the lower contracted and shortened, the innermost much exserted. *Seed* enclosed or shortly exserted, *elongate-ovoid,* obtusely angular, brown, up to 7 mm. long.

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Fig. 1, male branch, nat. size; 2, male strobilus, × 10; 3, a pair of flowers from the base of a strobilus, × 10; 4 and 5, androecium, × 10; 6, a fruiting branch, nat. size; 7, a semi-mature fruit, × 4·5; 8, same in longitudinal section, × 4·5; 9, a mature fruit, nat. size.

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